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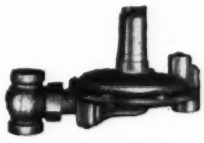
FLOW INDICATING METERS



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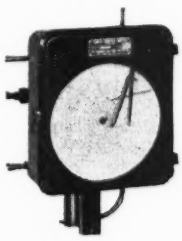

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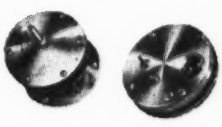

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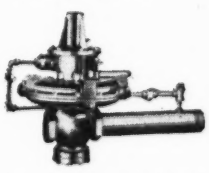

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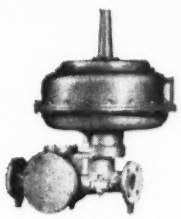

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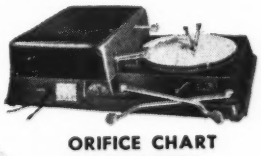

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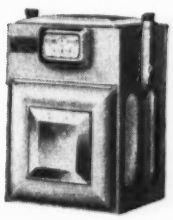
HIGH PRESSURE—015 PILOT LOADED REGULATORS

HIGH PRESSURE—015 INSTRUMENT CONTROLLED REGULATOR



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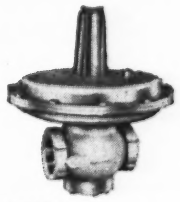

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FEBRUARY 1952 • VOLUME XXVIII • NUMBER 2

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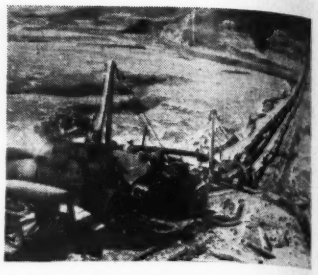

IN THIS ISSUE

Completed and ready for delivery of gas from Alberta to Montana, this line was sitting idle last month waiting for U. S. officials to issue import permits (see p. 101).

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GAS is published monthly by Jenkins Publications, Inc., 198 South Alvarado Street, Los Angeles 4, California. Subscription price, United States and possessions (in advance), 50 cents per copy; one year, $2.00; two years, $3.00. All other countries: one year, $4.00; two years, $7.00. Acceptance under Section 34.64 P. L. & R. authorized. Member: The Controlled Circulation Audit, Inc.; National Business Publications, Inc. GAS is indexed regularly by Engineering Index Inc. Publishers: BUTANE-PROPANE NEWS; Handbook BUTANE-PROPANE GASES; BOTTLED GAS MANUAL; WESTERN METALS. The name "GAS" is registered, U. S. Patent Office.

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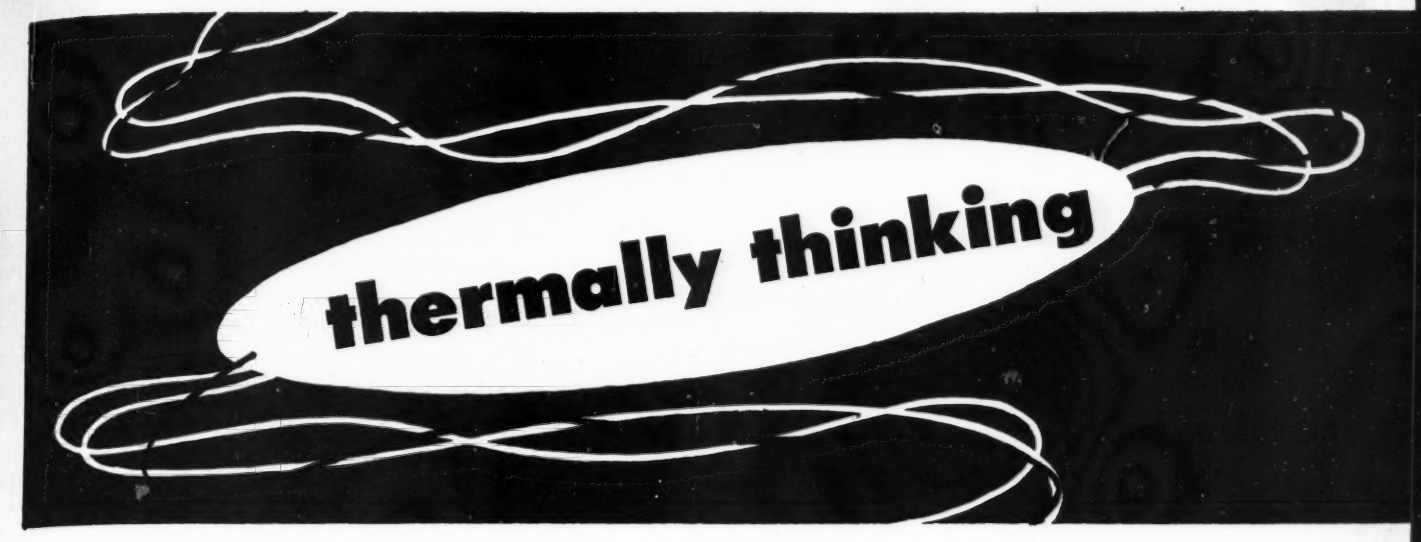

Trouble From the Left

TWO DISTURBING new elements have crept into the big Southern California Gas Co. rate case, on which hearings are now continuing in Los Angeles. SoCal is seeking an extra $16.6 million in revenues, with a $10 million interim boost. Returns which were brought up to 5½% in 1950 have skidded to less than 4%, with new capital investments bringing about 1%.

So Southern Cal is in one corner, battling for a rate boost. In the other corner, the usually fairly-well-informed opposition has been replaced by two fighters—OPS and the leftists—seconded by several blocs of rather vague origin whose names imply that they are citizens' "protective leagues."

The leftists have a reason to be in there—they might, conceivably, succeed in forcing public ownership of the utility if they work at it long and hard enough.

OPS has no excuse whatsoever for being there, unless it be to (a) waste taxpayers' money; (b) play the usual brand of Fair Deal politics, or (c) exercise its collective vocal cords.

Together, the factions make rather peculiar stablemates. Presumably, they have different ends (although it might be said that the administration is not particularly averse to public ownership of business). Their methods, however, are roughly parallel. They both, in brief, like to make a lot of noise.

Spokesman for OPS was Erich A. Schultz, district economist, who also reportedly was economic adviser to General MacArthur in Japan for two years and head statistician for the Manhattan A-bomb project. Called to the stand by Emil J. Broz, OPS attorney, Mr. Schultz took the opportunity to outline some rather elementary facts of economic life for the assemblage. Said he,

"Essential to the stability of the economy in (an all-out defense effort) is the stability of the price level. An inflationary spiral has a number of contributing causes, psychological and others. Its mechanics are quite simple because prices are interdependent. A selling price to one becomes a cost to another. Therefore, a price increase in one commodity brings higher prices for other commodities, with spiraling effect."

Up to this point, Mr. Schultz was on solid ground, but he didn't stay there long, viz.:

"Because of its important central position in the southern California economy, a price increase in gas rates would bring cost increases to agriculture, industry, and government, as well as to residential customers. These cost increases would result inevitably in upward pressure of prices of the commodities sold by these various users of the *original commodity*. Thus the whole cost-price structure is elevated."

This *original commodity* concept is rather fascinating, if academic. Mr. Schultz seemed to be presuming that the purveyors of this "original commodity" are immune to cost pressures themselves. Vice President Walter J. Herrman of SoCal put the finger on this idea very effectively. Mr. Schultz, he said in not so many words, was confused by cause and effect; that increased prices are the effect, not the cause, of inflation, and that the company is only trying to catch up to the higher costs of doing business.

Continuing, Mr. Schultz said:

"That (the elevation of the whole cost structure) is the threat posed by granting price increases which are not absolutely necessary for the preservation of an essential industry. Applications for rate increases such as these must be weighed very carefully."

The assumption here might have been that the public utilities commission, which required 16 months to pass on SoCal's last price raise, was in danger of making a too-hasty decision.

What OPS was doing at the PUC hearing was summed up nicely by Mr. Broz when he said, "We are not here as protestants. *We are here only to describe to the commission the efforts of OPS to stabilize the economy.*"

To the observer, it would seem that public hearings of the PUC, whose calendar is already overflowing, are a heck of a place to make a speech.

The leftists' immediate goal is to defeat the price raise—or is it to make enemies for the gas company? At any rate, the California Legislative Conference, listed by the California senate committee on un-American activities as a front organization, was officially represented at the hearings by Paul Major, another of the committee's listees. Gasco attorneys noted these facts—for the record.

Willing, if unwitting, abettors were such "consumer groups" as the Eastside Conference Against the High Cost of Living and the Housewives Committee for Lower Prices. They took their cue from the leftish tactics. One spokesman for the former group challenged the fact

that SoCal pays more to its parent, Pacific Lighting Corp., for gas than it does to El Paso Natural Gas Co. for Texas gas. Under cross-examination, he admitted he didn't realize that the company took delivery from Pacific Lighting wherever it's needed, while El Paso delivers gas at the border.

Another spokesman, a woman, complained that housewives are forced to "steal" from their food budgets (a very skillful maneuver, as any housewife will testify), and expressed righteous indignation over the new offices SoCal is erecting.

"Let them pay for it if they want it," she declared.

How to cope with such tactics is fast becoming a ticklish public relations problem for a number of utilities. Specific public information programs are still on a cut-and-fill basis, because the problem is too new—rate increases in the gas business having been an unborn breed until two or three years ago. Newspapers are not being helpful, except in rare instances; possibly the best that can be hoped for is that they won't take any editorial stand. The news columns, however, will continue to play up the opposition's statements, because—there's no doubt about it—they're good copy.

The net result in all these cases is that PUC's are being subjected to increasing pressures and resistance becomes increasingly difficult. The public's confidence in their integrity is being shaken. It's too bad that the OPS is one of those who are doing the shaking.

Expensive Supernumerary

Washington

OFFICIAL WASHINGTON is beginning to wonder out loud just what OPS is about in its gas rate case activities. Sen. Burnet R. Maybank (D.-S.C.), chairman of the joint congressional "watchdog" committee that hovers over the emergency agencies created by DPA, recently wrote to Price Boss Michael DiSalle wanting to know why the OPS kept intervening in these cases.

DiSalle's reply agreed that OPS should stay out of utility rate cases, except those which involve wholesale utility rates, as specified in the law. However, DiSalle's idea of what "stay out" means is very different from what the average American means when he uses the term. OPS assumes that whether or not it intervenes, to the extent of making a publicity showing, is altogether discretionary and that what Congress meant was that it was to concentrate on the wholesale rate cases.

In short, OPS apparently reserves the right to get into any kind of utility rate case—with the consent of the regulatory commission involved—if its officials believe the result would have an important bearing on the overall stabilization effort. In such an exceptional case, DiSalle pledged that his agency wouldn't resort to "dilatory tactics." He said that the OPS has authority for "consent" activity by virtue of "an inherent right" which was not affected by the specific provisions of the act which limit OPS appearance to wholesale rate cases.

What all this gobbledegook seems to mean—and *does* mean, in view of the record—is that the OPS has a right to intervene anywhere, if it can bully, bulldoze or otherwise horn in on any hearing. If such a novel rule of the law were followed by all agencies, then the Civil Aeronautics Board and the U. S. Board on Geographic Names, to mention only two of several thousand government bureaus, can intervene in gas rate cases because, so far as is known, nothing in the law setting up these agencies prohibits them specifically from appealing to FPC for permission to make a showing in gas rate cases. This statement by DiSalle is so novel as to be insulting, but Congressmen in this administration are not easily insulted.

The OPS has increased to nine the number of natural gas rate cases before the FPC in which the agency is taking a part, OPS has announced here. The three new cases involve Transcontinental Gas Pipe Line Corp., which proposes to increase its rates to some 52 resale customers in the East and South; Atlantic Seaboard Corp. and Virginia Gas Transmission Corp., serving customers in the East and Central Atlantic area; and United Fuel Gas Co., which does business in the mid-Atlantic area.

OPS' announcement of its intervention clearly states that "these rates are *not* subject to direct price control by OPS but must be approved by the Federal Power Commission."

"However, under the Defense Production Act, public utilities making application for an increase in wholesale rates must notify OPS and must consent to intervention by the agency in proceedings before the regulatory body," the announcement pointed out.

DiSalle said, in relation to these cases, that the "OPS is well aware of the importance of utility rates in the cost of living picture."

"We fear that, as is so often the case, these proposed wholesale increases, if granted, would be pyramided by resale markups at the retail level, with consequent increases to consumers of considerably more than $80 million . . .

"It is evident that in many cases the wholesale pipeline companies are seeking to pass on to the consumer recent federal income tax increases, levied to help meet the costs of the defense program and to combat inflation. Many are also attempting to raise the level of profit on their investment above that prevailing before Korea, and to translate every cost increase into a rate increase. We do not believe this is justified in a period of national emergency and we feel that disproportionate increases in natural gas rates would adversely affect the price stabilization program."

Mr. DiSalle's remarks, ignoring the economic facts of life as it is lived under permanent regulatory bodies, should nonetheless help him in his forthcoming Congressional campaign. Reason enough, no doubt, to keep OPS set in its role as an expensive, time-wasting supernumerary.

technical trends

Cooperative Cathodic Protection

IN PREVIOUS EDITIONS of this page mention has been made of the work of the Correlating Committee on Cathodic Protection, organized to promote uniformity and cooperation of thought and practice both industry-wide and nation-wide. The successive availability of four papers by this committee has also been announced.

These four papers are now obtainable in one cover as a "Report of the Correlating Committee on Cathodic Protection, July 1951." This 33-page publication can be obtained from the office of the National Assn. of Corrosion Engineers, 919 Milam Bldg., Houston 2, Texas, at a cost of 50 cents. It contains the four papers on management information, notification procedures, technical practices, and joint installations, and also several appendices including a selected bibliography. Possibly no subject of comparable scope and technical and economic complexity has been afforded such complete but short and understandable written treatment.

This booklet should have wide usefulness to all concerned with the operation and maintenance of underground or underwater metallic structures. Apart from its value to anyone desiring to obtain general information of a semi-technical nature on the specialized subject of cathodic protection, it should be very convenient to corrosion engineers for purposes such as the following:

To inform management of the objectives, problems and necessary procedures.

To similarly inform associates and co-workers.

To give to other organizations or individuals with whom cooperative negotiations or measures become necessary, particularly if the matter is new to them and they might view it with suspicion, because they can be shown that their industry or type of work is represented by or closely related to membership on the committee which prepared the book.

Spectrometers For Continuous Analyses

LITERATURE dealing with instruments and instrumentation has recently described the development of spectrometers to the point where they have practical use for the *continuous* and *automatic* analysis of components of process industry plant streams. While such analyses are presently of more interest to the petrochemical and petroleum industries than to the gas industry, they are applicable to fuel gas and related mixtures and therefore a brief mention of them seems appropriate.

The infrared spectrometer is one type that can be used as a continuous analyzer. Some of the applications which have been field-tested are the determination of methane in manufactured and natural gas blends, of methane in annealing furnace atmospheres of acetylene in a 14-component mixture, and of n-butane in a methane, ethane, propane, iso-butane, carbon monoxide, and carbon dioxide mixture. Another type is the mass spectrometer (for general description see *GAS,* May 1945, p. 28), adapted for continuous monitoring of a single component. One example cited is the recording of the percentage of ethane in the bottoms stream from a de-ethanizer distillation column.

Neither of these units is cheap, a complete installation costing several thousand dollars; they require maintenance and upkeep by trained personnel; and either automatic or manual calibration or standardization is necessary at suitable intervals, using either specially prepared gas samples or samples of the plant stream that have been analyzed by some other means. Nevertheless, in certain operations the rapid and continuous information that is supplied is well worth such expense, and wider use is confidently expected by the instrument manufacturers.

Gas Transmission Line Failures

A RECENT COMPILATION by the Federal Power Commission indicates that 1712 pipeline failures have occurred on lines operated by 28 major gas transmission companies over the past 10-year period. These data were compiled for use in congressional studies of legislation for the establishment of a safety code for operation of natural gas pipelines, a measure for which has been introduced by a representative from Massachusetts.

Of these failures, 848 were encountered in operation, and 864 occurred during testing (661 of the latter on the Big Inch system). More than half of the failures were in welds, 98 were due to blowout, and 183 from pullout of couplings. Twenty-seven were caused by road machinery and 73 by other machinery. River crossings were responsible for 88, 55 of which were from washouts. One hundred thirteen were due to corrosion, 51 occurred at bends, and 23 were in auxiliary equipment.

It would seem that the 848 operating failures have the most significance, but that such a number is not excessive in many thousands of miles of line over a 10-year period. This is another illustration, however, of the increasing tendency to impose controls over industry whenever untoward incidents occur with sufficient frequency to attract outside attention.

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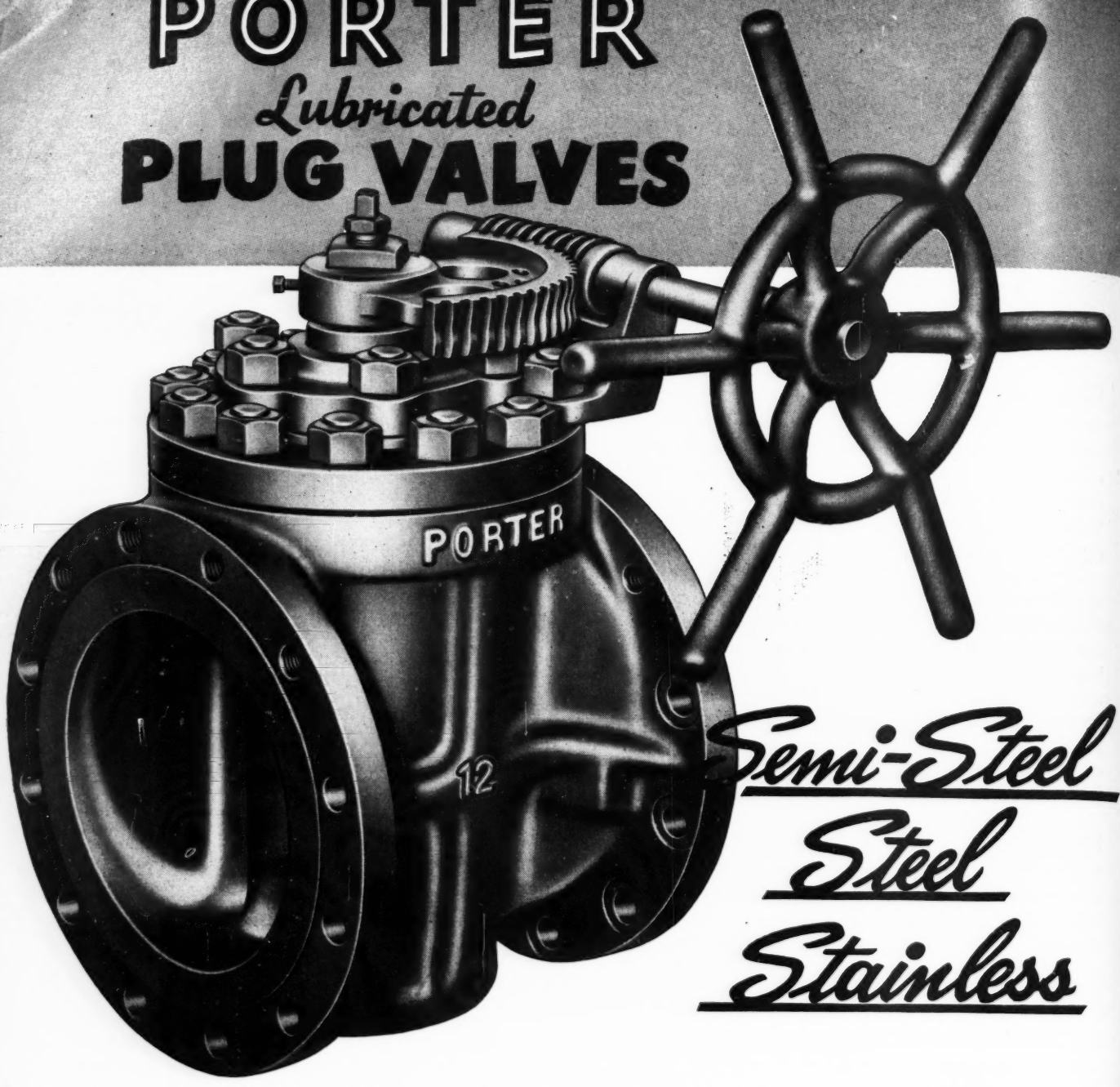

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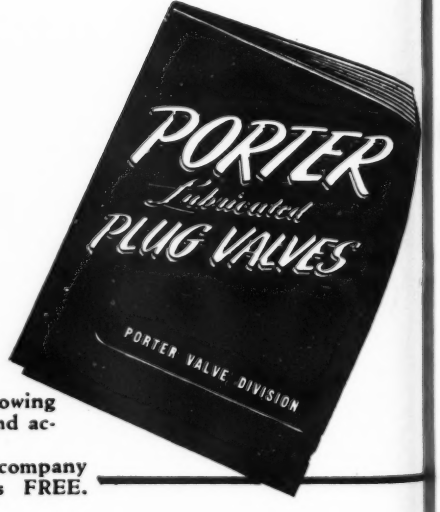

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It's from the standpoints of rate level, rate form, and volume allocation that a rate philosophy must be approached.

Rates for Long Distance Pipelines

By W. B. TIPPY

WHAT is a proper approach as to rate philosophy for the determination of reasonable rates and regulations for transcontinental natural gas pipelines which will recognize the many economic elements involved?

Although I've been dealing with many of the problems of the gas industry for several years and, particularly, with the problems arising from the distribution of natural gas, I want to make it clear at the outset that I make no pretense to any perfect knowledge as to what is the one best solution for any of the particular present-date rate and regulatory problems with which the industry is faced. Also, I have no prophetic insight into the future or as to the ways and means of meeting the many future problems that will arise, so all I propose to do is to attempt as analysis, as one engineer in the industry, of some of the present-day phases of natural gas regulation.

In late 1951, Mr. Tippy became president of Commonwealth Gas Conversions Inc., a newly incorporated subsidiary of Commonwealth Services Inc., New York management and engineering consulting firm. Mr. Tippy is also vice president and a director of the parent company.

Three Major Areas

Natural gas regulatory problems divide into three major areas: production, transmission, and distribution. Two of these we shall dispose of in very brief fashion. As to "production," it seems sufficient to point out that in this field there is very little history or experience in rate regulation as such. To date regulation of production has been largely a state matter and has dealt principally with protecting producers against "freeze-outs" by the pipeline companies or preventing the waste that used to result from a "flush production" scramble.

Whether regulation of production will remain relatively limited is yet to be seen. In its Phillips decision the Federal Power Commission has recently indicated reluctance to extend its jurisdiction into this area, but pending court appeals leave uncertainty as to the ultimate outcome. The present situation is further complicated by the U. S. Supreme Court's Kansas field price decision, which many pipeline companies are endeavoring to make use of in connection with current FPC rate cases.

Let us also pass quickly over "distribution" regulatory problems, since they form a complicated field of inquiry of themselves. I should merely like to comment that two of the principal sources of current troubles which bother me seem to arise from:

First, the fact that local distribution companies are public utilities in the fullest sense of the word and are therefore expected to meet all reasonable requests for service promptly, whereas the pipeline suppliers are not public utilities in that the Natural Gas Act allows them to determine in their own discretion whether and when they will increase their capacity to render service.

Second, the price of gas is regulated without regard to its value and has remained low in a period of violent inflation, whereas the other fuels with which it competes—that is, coal and oil—have risen tremendously in price.

These two factors are at the roots of most of the headaches in gas regulation at the local level with which I have been concerned. I think it would be safe for me to venture to predict that as long as natural gas continues to sell below its value, or until the potential market is completely served with gas, the natural gas industry is faced with continuing restrictions, particularly restrictions from here on out as to the attachment of new space heating installations.

Turning now to transmission line regulatory problems from the distribution company point of view: They appear to divide between rate level, rate form, and volume allocation problems.

Level Unimportant

With regard to *the level of rates* charged by transmission companies to distribution companies, it seems to me that within quite a wide range the problem of rate level should be relatively unimportant to the distribution companies. Lest this shock anyone too much, I hasten to add that in my opinion the public interest lies *not* in continually reducing pipeline prices, but in providing adequate incentives to the transmission lines within practical limits so that they

will go out and get—or, if necessary, develop—new reserves, and will wish to enlarge their facilities to bring more gas to the distribution companies. It is my feeling that getting the gas for the ultimate consumers is of far greater importance and is much closer to the true public interest than trying to hold down to the lowest possible level the price of a commodity already held by regulation to a point far below unregulated competing fuels.

However, a distressing procedural problem has arisen recently from the provision in the Natural Gas Act which limits suspension by the Federal Power Commission of a proposed pipeline rate increase to a period of five months, following which the pipeline may take steps to place the new rate in effect and collect, subject to possible refund, under bond from its customers pending determination of the final rate.

The difficulty arises in that no comparable procedure appears available to the distribution companies for promptly passing such increases on to their ultimate customers. With some pipelines now collecting on at least two increases without any final rate determination, the resultant squeeze on distribution companies becomes of critical importance. A recent tendency to settle many of the pipeline rate cases promptly should help the distribution companies somewhat by removing the long period of uncertainty as to their final cost of gas, but the time lag between relief to the pipeline in its rates and subsequent relief to the distribution company remains one of the most vexing regulatory problems of the day.

To digress for a moment, let us also consider briefly the question, "What is regulation in the public interest?" Or, in other words, what are proper objectives on which to base a sound theory of regulation of the level of rates, whether for transmission or distribution companies? The principal items appear to me to be these:

> First, provision must be made for adequate and reliable service at reasonable cost, which means pricing in line with the value and quality of the service rendered.
>
> Second, to provide such service in a period of growth, a company must be strong, with earnings adequate not only to attract the risk capital necessary to finance necessary expansion, but, equally important, to provide incentives to the management to face up to and assume the risks of rapid or unusual plant expansion.

In my opinion, the public interest lies in satisfying both of these items, which means a departure from the rigid formula approach of 6% to 6½% return on original cost less accrued depreciation as the top limit.

As to the *problem of rate form,* an increasing number of instances appear to indicate that a single, simple demand-commodity rate form (or such a rate supplemented by a flat rate for small customers) is not wholly adequate to meet the test in all situations. In my opinion, the test of reasonableness of rate form is a very simple one, although, as is true of most elements in rate making, it is not and cannot be precise. It seems to me the proper test is the resulting impact of a proposed form of rate upon the distribution company customers served by the pipeline.

Single Formula Inadequate

From the standpoint of apportionment of costs, the demand-commodity form has considerable merit if the costs involved are properly apportioned between these two elements. Here again, however, no single formula, such as the so-called Mississippi River Fuel formula, is the "be all and end all" for such distribution of costs.

The position taken by some pipeline companies in recent rate cases that all relatively stable costs relate to demand and that only such costs as vary in direct proportion to the volume of gas pumped are proper commodity costs also fails to meet the test in many instances. The facts will be different with each pipeline considered, but a philosophy sufficiently flexible to yield tenable results in each case is the one that all costs clearly related to the peak day should be considered as demand costs, all costs clearly related to day-to-day operation of the line and the annual through-put should be related to commodity and that all costs neither predominantly demand nor commodity should be arbitrarily split, perhaps half and half, between the two.

Even more important, the cost-of-service-study and the allocation resulting from application of the principles above is not in itself anything precise, but should merely be a guide to judgment and a test as to whether the rates finally devised are within the realm of reason. The true test again is the impact on the customers. The demand charge should be high enough to recover costs properly associated with demand but should not be upped beyond this level for punitive purposes to discourage the attachment of business.

Furthermore, the unduly low commodity charge corresponding to a high demand charge would have the undesirable effect of encouraging dump sales, since, after determining the level of return desired, these demand and commodity charges are like two people on opposite ends of a teeter-totter and justice is done to the pipeline company within a fairly wide range as long as the demand and commodity charges selected correspond to each other.

Emphasis on Impact

What is needed is less thinking in terms of precise formula and more consideration of the impact of a rate proposal on the distribution company customers and the ultimate markets they serve. Such a study of relative impact is admittedly complicated and involves proper evaluation of growth characteristics of an area, present space heating saturations, potential space heating markets (giving consideration to prices of competitive fuels in the area), types of industrial loads available, economics of peak shaving, availability of underground storage fields (and economic impact of such use of underground storage), availability of local gas supply, availability of gas supplies from other pipeline suppliers, historical costs of gas on which local rates have been set and local business built up, and many other factors.

Too often only a few of these elements have actually received consideration in formal rate cases. Much remains to be done, but if the focus of attention can be directed to impact on the customer companies rather than the desire for any over-simplified formulae, there is hope that better results will be achieved.

We have suggested that the commodity price should not be so low as to encourage dump sales. In this connection, it should be recognized that the customary demand-commodity type of rate causes a distribution company to want to make such sales. The theory is that having paid a demand charge based on peak day winter use, it is somehow in the public interest that the distribution company should try to take gas at a 100% annual load factor regardless of the use to which such gas is put or the low price at which it must be sold to achieve a high load factor.

I submit that the public interest *doesn't* require that the distributor follow such a program. This means that appropriate ways must be found to remove the incentive created by the usual demand charge toward filling up the

"As to the problem of rate form, an increasing number of instances appear to indicate that a single, simple demand-commodity rate form (or such a rate supplemented by a flat rate for small customers) is not wholly adequate to meet the test in all situations . . . .

"What is needed is less thinking in terms of precise formula and more consideration of the impact of a rate proposal on the distribution company customers and the ultimate markets they serve . . . .

"I, for one, believe that unless there is some unforeseen and sharp reversal in the economic cycle in this country, which would again price gas above competing fuels, we shall never again reach the point in the older natural gas areas where space heating customers can be attached without restriction."

summer valley with dump sales. One way would be to permit the summer demand charge to drop to the level of the summer monthly demands, but this creates an undesirably vague relationship between peak demand on the line and annual demand charge which would prevent satisfactory advance estimating of pipeline revenues.

A modification of this which permits lower summer demand charges predetermined by agreement, which was established by the FPC in a recent rate decision, may prove to be a step toward a more workable solution although in the case in question it had the collateral undesirable effect of shifting charges from the poor load factor customers to the ones having a good load factor.

The point should be kept in sight that the division of cost between demand and commodity is primarily a means of apportioning charges between customers in relation to the impact their loads impose upon the pipeline. Any specific demand and commodity rate is usually determined in the light of existing load patterns and, as I have said, ways should be found to prevent such a rate from becoming a challenge to the distributors to enter into undesirable and wasteful sales for the mere sake of improving load factor and thus changing load patterns just to take advantage of the rate.

The last transmission phase of this discussion deals with *volume allocation problems* as they relate to regulation. Here again, as long as gas is underpriced with relation to competitive fuels, there seems to be little chance of the law of supply and demand providing for an orderly development of the business.

As long as everyone can sell all the gas he can get there is no possibility of balancing out a line, except by either having the parties involved enter voluntarily into limiting contracts or by provision of some kind of volume allocation system which prevents one customer who may be able to enter into a favorable contract from obtaining undue advantage over another customer not so fortunate.

Fundamentally, the test as to who should get how much of a new piece of capacity on a pipeline should be relatively simple. The test should be the impact on the market served, that is, on the ultimate consumers. In dealing with any scarce commodity the objective should be to let the impact of scarcity fall on everyone as equitably as possible.

Here again there is a difference between a rather simple theory and practical operation. The difficulties arise from the almost infinite number of possible variations in the relationship between the various important factors, but complexity itself should not become an excuse for ignoring the factors.

Here the extension of FPC jurisdiction through the allocation of volumes of gas to distribution company customers has had the effect of reaching through into an area of regulation supposedly reserved by the Natural Gas Act to the state commissions. As long as the economics are what they are today, such a conflict appears to be inevitable.

Regardless of inevitability, it is quite evident that FPC is in fact determining what loads shall be served, by what distribution companies, and in what states, and that all this is in conflict with the concept that a local gas distribution company is a public utility and, in theory at least, is bound to serve the demands of its public. The price problem and the physical limitations on gas reserves and on the ability to construct long-distance pipelines has, it would appear, rendered the concept of public utility status null and void, at least as far as the attachment of space heating business is concerned.

I, for one, believe that unless there is some unforeseen and sharp reversal in the economic cycle in this country, which would again price gas above competing fuels, we shall never again reach the point in the older natural gas areas where space heating customers can be attached without restriction.

With regard to the factors considered in cases concerned with the allocation of gas volumes, one or two major elements do not seem to have received the full recognition due them when the impact of a specific formula on the markets served is tested. One such missing factor is consideration of the total cost to the pipeline's customers of gas delivered to their distribution systems and the impact of such costs on the ultimate markets served.

The allocation theory employed appears to have been that if some way is found to meet peak day sendouts for everyone, the job of allocating gas volumes is done and the relative costs to the distribution companies of the several different methods of meeting peaks is of no concern. However, it would appear that cost is such a vital element in a business economy such as ours that it cannot be so ignored.

Another missing factor, and one which must be considered if the real meaning of underground storage is to be understood, is proper regard for *annual* volumes, in addition to *peak day* volumes, in their relation to the markets served. The key here lies in the realization that with a storage program, annual volumes are just as important as peak day availability, whereas about the only concern of the daily full requirements type customer is peak day availability.

By the use of these charts let us illustrate the impact on an assumed market, served in three basic ways, of various annual and peak day volume conditions and the costs associated with them:

Fig. 1 is a somewhat simplified chart of the requirements throughout the year of a distribution company customer whose maximum demand is 10 MMcf and whose annual load factor is 40%. This customer requires an annual volume of 1460 MMcf. Now assume a 40% addition to peak load, or 4 MMcf, through adding space heating load which has an assumed annual load factor of 27½% and thus requires an additional annual volume of 400 MMcf. We shall now consider possible ways to serve this market.

First, let us assume a daily full requirements customer with a 10 MMcf contract demand as shown in *Fig. 2* and also assume a rate of $2 demand charge per

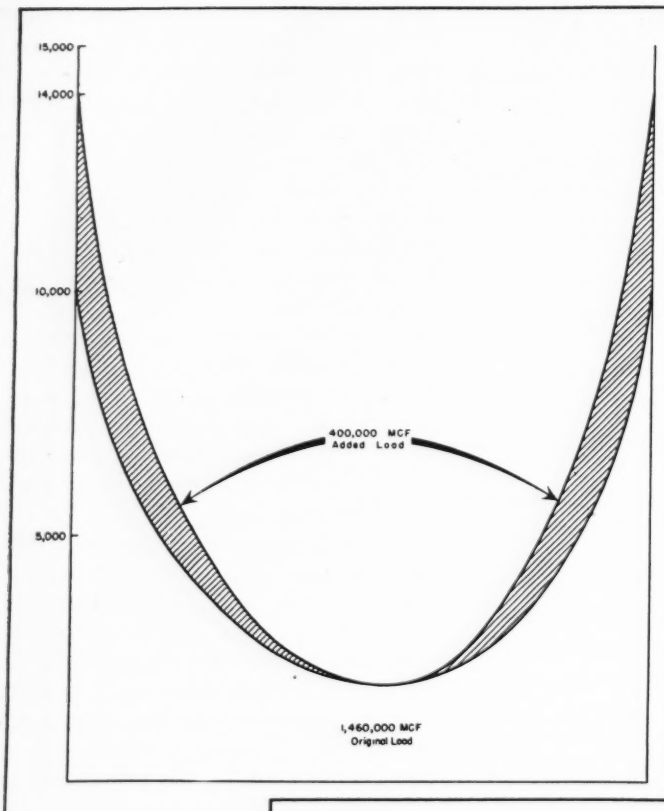


FIG. 1

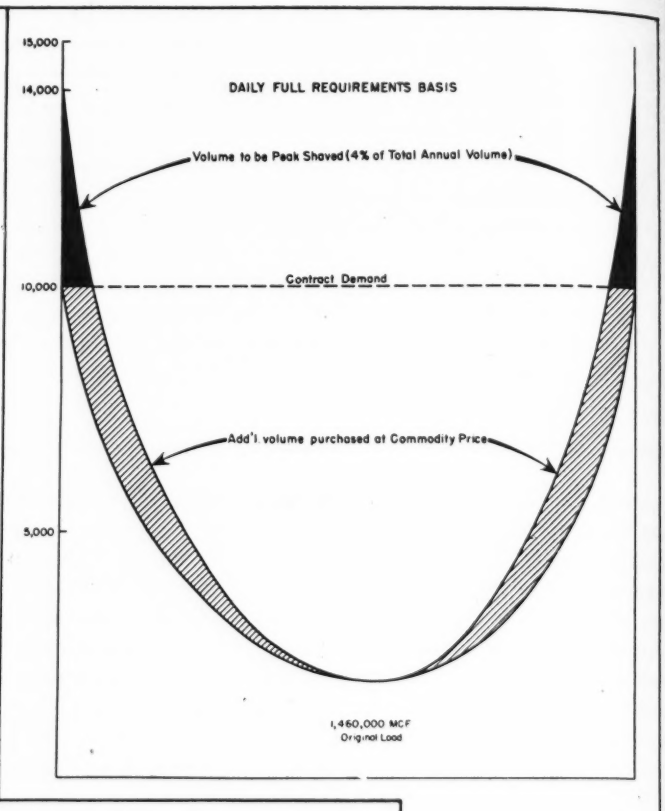


FIG. 2

ASSUMED TYPICAL DISTRIBUTION COMPANY REQUIREMENTS CURVE

1. 10,000 Mcf peak day demand and 40% annual load factor.
2. 4000 Mcf (or 40%) peak day load added; 2000 additional space heating customers with a 27½% annual load factor, 400,000 Mcf additional annual requirements.

FIG. 3

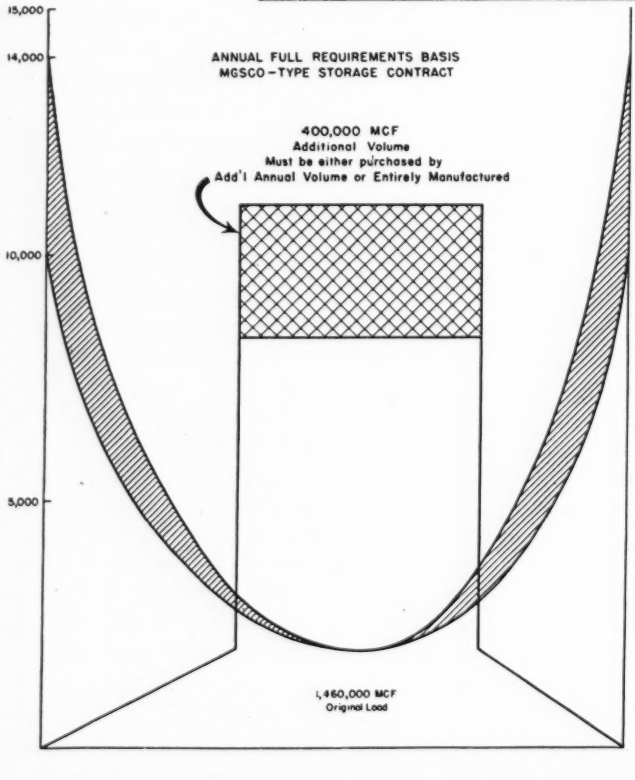
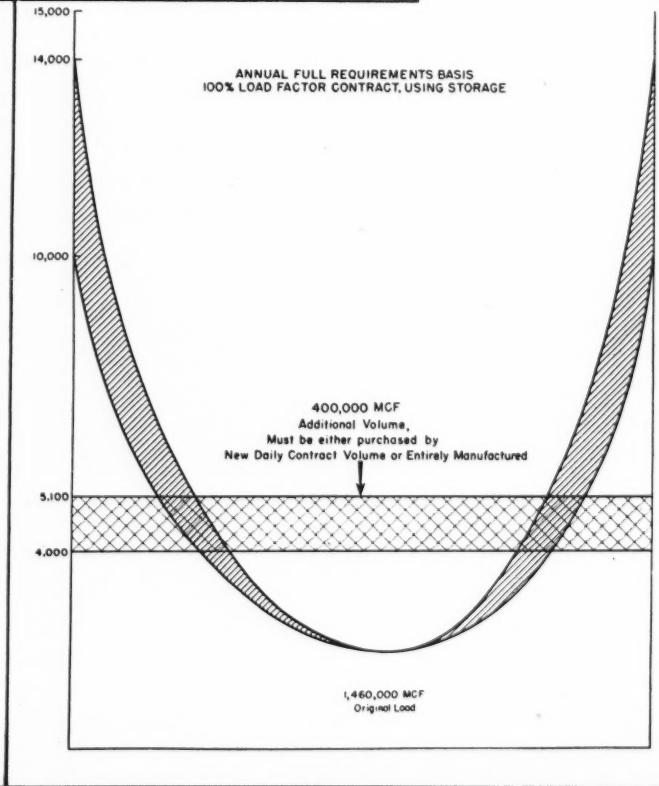


FIG. 4



month and 15 cents per Mcf commodity charge. It can be readily calculated that this customer's present load will be served at a cost of 31.4 cents per Mcf. If this customer can increase his contract to 14 MMcf, his average cost for the whole load will be 33.1 cents.

If he *can't* contract for more peak day gas, he *can* install peak shaving equipment at about $75 per Mcf of deliverability and by manufacturing only about 4% of his annual voume at an added cost assumed at $1.50 per Mcf, plus fixed charges on his added investment at 13%, can still serve a 40% load addition and end up with an average cost per Mcf of only 35.6 cents.

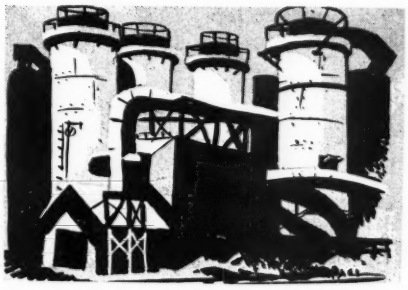
Fig. 3 shows the same load served by an underground storage program large enough to meet the entire winter peak and to store enough gas in the summer months to meet nearly two-thirds of the customer's annual requirements while only about one-third is met by direct pipeline deliveries.

Such a storage program as is illustrated here may require an investment of the order of $100 per Mcf of peak day deliverability, if suitable fields can be found near enough to the market. In one project somewhat similar to this, the operating expense ran last year about 4 cents per Mcf, based on the total annual volume to market, plus fixed charges on the storage plant investment.

If it is assumed, as has been proposed in one rate case, that the rate for the purchase of such storage gas from the pipeline is the 100% load factor equivalent rate, 21.6 cents on our assumptions, then the *total* cost of gas to serve the initial load assumed will be 12.9 cents more than this as a result of fixed charges and operating expenses relating to the storage operation, or 34.5 cents per Mcf.

Assuming the company can contract with the pipeline for an extra 400 MMcf of annual volume to take on the new load and that another $400,000 of investment is added to further develop storage system deliverability to meet the peak, we find the average cost becomes 35.4 cents per Mcf—just about the same as the daily full requirements the customer would pay even if he *couldn't* increase his contract demand but went ahead with considerable peak shaving.

But suppose the storage customer *can't* get more gas. He can't just peak shave a small percentage of his annual volume and still get by with a low final cost. The storage type service is much more restricted than the daily full requirements service and depends completely on annual volume. If the storage customer peak shaves, he has to peak shave the *entire annual volume for the business added.*



Using propane and assuming only $1.25 per Mcf manufacturing cost plus a little more liquid storage because of the continuous year-round operation required—say an investment of $100 per Mcf of deliverability—it works out that the manufacture of 400 MMcf, or over 22% of the entire annual volume, would cost the storage customer $1.42 per Mcf and the aggregate cost of this extra gas would be more than the entire cost of the original 1460 MMcf. The total average cost of all gas would rise to 57.6 cents per Mcf.

Obviously, peak shaving is not a practicable means for the storage type customer's meeting even normal load growth. His only alternatives are either to get assured increasing annual volumes of gas each year or else to cut off an equivalent annual volume of industrial load already being served. He has no flexibility as does the daily full requirements customer and must consequently plan far ahead and plan carefully if he is to avoid serious trouble.

From *Fig. 4* it will be seen that the same thing is true to a marked degree with the intermediate class of customer who buys on a 100% load factor annual contract basis, stores a good proportion of his summer gas to meet winter peaks and sells any gas left over on an interruptible basis. Such operation requires handling only about half as much gas through storage, and a somewhat smaller investment than would be the case with the full storage program just examined.

However, it should be pointed out that this operation is also inflexible as to annual volumes. If the 100% load factor customer lets his peak load get ahead of the annual volume he can store to meet his extra winter requirements, or if he's improvident and sells too much of his summer gas to industrial customers on an interruptible or dump basis, he's in real trouble when winter comes along. He has to have not only the peak day deliverability for his new loads but also the annual volumes to serve them or he ends up in the same spot that the full storage customer did and has to manufacture the entire extra annual volume sold.

As to relative costs of service, this type of customer, if he used storage to meet the balance of his peak not covered by the 4 MMcf contract demand, would have had an average cost which calculates to 28.9 cents per Mcf with the initial load. With the added load, the cost only moves up to 29.8 cents, if the company can increase its contract demand to 5100 Mcf. But if the company can't increase its contract demand and tries to manufacture the necessary 400 MMcf of additional load on the uniform year round basis assumed in the storage example, its cost for all gas goes to 52.8 cents per Mcf. Again, not a very practical solution to the problem.

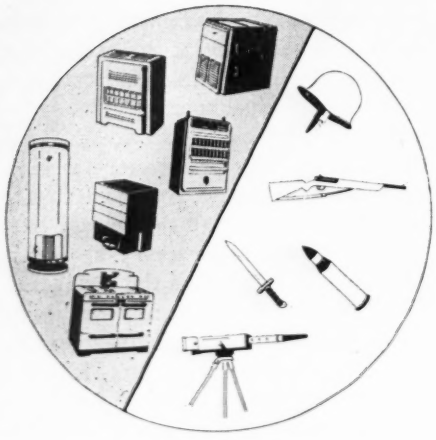
It is hoped that these examples demonstrate something of the economics of these methods of supplying markets and point out why costs are such an important part of an equitable solution to both the balance between types of rates and the allocation of gas volumes as between distribution companies buying gas on different bases where all are serving markets quite similar.

The Test of Impact

To draw this all together, whether the problem be one of rate level, rate form or allocation of gas, any proposed solution should meet the test of fair and equitable impact on the markets served. This requires careful consideration of all factors involved rather than reliance on simplified formulae.

To date, it appears that many of the hearings and resulting orders have not really come down to the full and true impact on the markets served. For instance, by excluding cost from consideration, proper evaluation of the possibilities of peak shaving for daily full requirements customers cannot be made. Also, there still remains to be worked out an acceptable technique for dealing with the amount of consideration that should be given to the present and prospective other sources of supply of so-called partial requirements customers, yet this factor should be considered in evaluating true impact on the markets served.

The hope for the future lies in constructive thinking and discussion about these problems within the natural gas industry. Continuing cooperative effort is necessary if a satisfactory way out of the present situation ultimately is to be found.



Poll Shows Manufacturers Expect Output Cuts, See Need for Defense Contracts

A complete breakdown of results, showing 1951 production and percentage of total production of manufacturers whose opinions are grouped, appears on the opposite page

WITH the availability of increasingly skimpy materials expected to determine production ceilings, gas appliance and equipment manufacturers foresee in 1952 volume cuts ranging as high as 24% from 1951 marks, GAMA reported last month.

The association, compiling results of its annual survey in which manufacturer members are polled on prospects for business during the coming year, warned that plants may have to turn to increasing defense contract work or shake up their physical structures in order to operate at or above a hypothetical break-even point.

Touchy spots in the production picture are water heater manufacture, where a 19% production decrease is predicted by manufacturers who declare they must maintain activity at 81.4% of 1951 in order to break even; domestic range production, where 83.7% of 1951's mark is anticipated against a break-even point of 81.4%; hotel and restaurant equipment, which could skim through at 86.9% activity, anticipating a 12% drop; and gas unit heaters, where the expected 22% cut would bring activity well under the 83.3% needed for break-even.

Manufacturers of other types of heating equipment are more optimistic. Production of central heating equipment is expected to rise 3%, direct heating equipment to remain the same, and floor furnaces to drop only 5% as against a break-even point of 79.2%.

In general, however, the larger companies have already inked important defense contracts and expect to add others in 1952. Of the industry's total productive facilities, 19% have already converted to defense work or are about to. Of the facilities operated by just those manufacturers converting, 30% are being set up for defense work.

Furthermore, the break-even point was determined on the basis of appliance production only, so a number of manufacturers are already in a sound position—particularly the larger ones, with diversified facilities.

On a unit shipment basis, gloomy range manufacturers have set their sights at 1,825,000, which would make 1952 only slightly better than 1946, about 300,000 worse than 1949, and considerably behind all other post-war years. Water heater makers, on the other hand, expect to sell 1,620,000 units, which would surpass 1946, 1948, and 1949.

In spite of the general feeling that 1952 will see a further downturn in production, and that materials shortages will be the root of the trouble, manufacturers have a strong sense of the urgency of continuing to sell to the limits of capacity. Only a smattering of companies will decrease their advertising and promotion budgets during the year, while a much stronger proportion will increase theirs. On the average, manufacturers plan to hold the line at 1951's level of activity.

Appliance Men Prove Accurate Seers

E. R. Martin

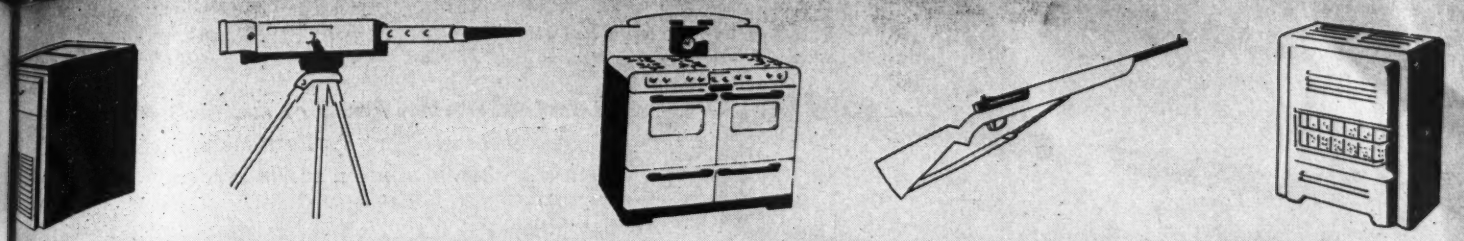
Every December Edward Martin, GAMA statistician, polls the association's members for their predictions on business during the succeeding year. A year ago, faced with problems concerning materials availability, manpower, and conversion to defense work, manufacturers went out on a limb to estimate 1951 sales.

Domestic range manufacturers last January predicted that 1951 sales would be about 23% below 1950 levels and would approximate 2,325,000 units. Actually, 1951 range sales totaled about 2,400,000 units, a 20.6% drop. Manufacturers of automatic gas water heaters looked for a 1951 drop of 25% from 1950's 2,363,000; the year actually ended about 16% below 1950 levels, with sales totaling 2 million.

Sales of gas-fired central heating equipment in 1951 fell about 40% below the record year of 1950. Floor furnace sales followed the same pattern. Restrictions on gas for househeating pushed these sales to a point below what might have been termed a "normal" drop. Manufacturers predicted that 1951 sales would be 22% under the previous year's.

Heating restrictions, on the other hand, helped direct heating equipment makers to wind up 1951 about even with 1950, saleswise. They had expected a 22% drop.

For 1952, last year's uncertainties still exist. Despite such obstacles, GAMA members have proved their ability to predict sales with a good deal of accuracy, so this year's survey may be accepted as an authoritative estimate of what's ahead for the next 12 months.



THE 1952 SALES PICTURE

No. of Mfrs.	Estimated 1951 Shpts.	% of Shpts. Reported	WATER HEATERS: 39 manufacturers, who shipped 1,544,394 units, 77% of total, reported:
-	82,120	5.3	Expect business to increase 10 to 50% in 1952.
-	1,058,964	68.6	Expect 7 to 25% less business.
-	403,310	26.1	Expect no change in volume of business. Consensus (weighted average): -19%. Thus, 1952 sales indicated at 1,620,000 units.
-	1,077,331	69.8	Expect no change in amount of advertising and promotional activity.
-	332,063	21.5	Expect a 15 to 50% increase.
-	135,000	8.7	Expect a decrease in advertising, promotion.
19	1,097,418	71.7	Assumed defense contracts in 1951.
20	446,976	28.9	Did not assume defense contracts in 1951. With 20 companies (51% of those reported) accounting for 28.9% of shipments without defense work, it is apparent that such work was absorbed by larger companies with more diversified facilities.
17	955,605	61.9	Have contracts or assurance of contracts for defense work during 1952.
22	588,789	38.1	Have no contracts for defense work in 1952. With 22 companies (56% of those reported) accounting for only 38.1% of shipments not assured of 1952 defense work, it is again apparent that the larger companies enter 1952 with assurance of defense work.
19	1,023,734	66.3	Expect to convert (or maintain) 10 to 50% of production facilities to defense in 1952.
20	520,660	33.7	Do not expect to convert to defense activity. Consensus: Indications are that 28% of these facilities are now converted, or will be converted to defense in 1952. This would be 19% of the total reported.
-	1,178,223	76.3	Anticipate a break-even point of 81.4% of 1951 production (no defense contracts considered).

No. of Mfrs.	Estimated 1951 Shpts.	% of Shpts. Reported	CENTRAL HEATING: 38 manufacturers, who shipped 239,390 units, 39% of total, reported:
-	93,180	38.9	Expect business to increase 2 to 40% in 1952.
-	93,793	39.2	Expect business to decrease 10 to 40%.
-	52,417	21.9	Expect no change in volume of business. Consensus based on replies from 38 firms is that sales will be slightly (3%) above 1951 level of 610,000 units.
-	143,973	60.2	Expect no change in amount of advertising and promotional activity in 1952.
-	72,343	30.2	Expect a 5 to 100% increase.
-	23,074	9.6	Expect a decrease in advertising, promotion.
25	200,382	83.7	Assumed defense contracts in 1951.
13	39,008	16.3	Did not assume defense contracts in 1951. It is apparent that in many instances small manufacturers did not assume defense work.
20	165,742	69.2	Have contracts or assurance of contracts for defense work during 1952.
15	61,718	25.8	Have no contracts for defense work in 1952.
3	11,930	5.0	Did not reply regarding defense work. Smaller companies (from point of shipments) are those without defense contracts for 1952.
19	168,004	70.2	Expect to convert (or maintain) 10 to 85% of production facilities to defense in 1952.
19	71,386	29.8	Do not expect to convert to defense activity. Consensus: Indications are that 43% of these facilities are now converted, or will be converted to defense in 1952. This would be 30% of the total reported. (Assuming production and shipments equal.)
-	136,886	57	Anticipate a break-even point of 92.2% of 1951 production (no defense contracts considered).

No. of Mfrs.	Estimated 1951 Shpts.	% of Shpts. Reported	UNIT HEATERS: 14 manufacturers, who shipped 120,197 units during 1951, reported:
-	27,455	22.9	Expect business to increase 15 to 50% in 1952.
-	75,765	63.0	Expect business to decrease 10 to 40%.
-	16,977	14.1	Expect no change in volume of business. Consensus:-22%.
-	113,377	94.3	Expect no change in amount of advertising and promotional activity. Includes one company contemplating a minor decrease.
-	6,820	5.7	Expect a 10 to 35% increase.
8	24,520	20.4	Assumed defense contracts in 1951.
6	95,677	79.6	Did not assume defense contracts in 1951. Companies reporting nearly 80% of total did no defense work. Most of those who did defense work also make other appliances.
6	21,950	18.3	Have contracts or assurance of contracts for defense work during 1952.
8	98,247	81.7	Have no contracts for defense work in 1952. Companies producing majority of unit heaters have no 1952 defense work. Most of those with assurance of such work also manufacture other appliances and equipment.
6	26,189	21.8	Expect to convert (or maintain) 40 to 50% of production facilities to defense in 1952.
8	94,008	78.2	Do not expect to convert to defense activity. Consensus: Indications are that 49% of these facilities are now converted, or will be converted to defense in 1952. This would be 11% of the total reported.
-	102,635	85	Anticipate a break-even point of 83.3% of 1951 production (no defense contracts considered).

No. of Mfrs.	Estimated 1951 Shpts.	% of Shpts. Reported	GAS RANGES: 15 manufacturers, who shipped 827,870 units, 35% of total, reported:
-	167,147	20.2	Expect business to increase 6 to 21% in 1952.
-	486,470	58.8	Expect business to decrease 10 to 37%.
-	174,253	21.0	Expect no change in volume of business. Consensus: -2%. Thus, 1952 sales indicated at 1,825,000 units.
-	697,838	84.3	Expect no change in advertising and promotional activity. Includes one company reporting a minor decrease.
-	130,032	15.7	Expect a 20 to 200% increase.
10	703,067	84.9	Assumed defense contracts in 1951.
5	124,803	15.1	Did not assume defense contracts in 1951. With companies which did no defense work (33% of those reported) accounting for only 15% of shipments, it appears that small manufacturers did not take on defense work.
7	522,987	63.2	Have contracts or assurance of contracts for defense work during 1952.
8	304,883	36.8	Have no contracts for defense work in 1952. Smaller companies (from point of shipments) are those without 1952 defense work.
7	512,987	62.0	Expect to convert (or maintain) 5 to 50% of production facilities to defense in 1952.
8	314,883	38.0	Do not expect to convert to defense activity. Consensus: Indications are that 30% of these facilities are now converted, or will be converted to defense in 1952. This would be 19% of the total reported.
-	655,230	79.1	Anticipate a break-even point of 83.7% of 1951 production (no defense contracts considered).

No. of Mfrs.	Estimated 1951 Shpts.	% of Shpts. Reported	DIRECT HEATING: 25 manufacturers, who shipped 887,700 units, 44% of total, reported:
-	53,792	6.1	Expect business to increase 15 to 70% in 1952.
-	301,216	33.9	Expect business to decrease 10 to 40%.
-	532,700	60.0	Expect no change in volume of business. On this basis, sales indicated at about 2 million units in 1952, which is 1951 estimate of shipments.
-	400,365	45.1	Expect no change in amount of advertising and promotional activity in 1952.
-	355,642	40.1	Expect a 15 to 100% increase.
-	131,701	14.8	Expect a minor decrease.
13	341,637	38.5	Assumed defense contracts in 1951.
12	546,071	61.5	Did not assume defense contracts in 1951. Companies producing almost two-thirds of total did no defense work. The majority of those who did defense work also manufactured other types of gas appliances and equipment.
12	340,462	38.4	Have contracts or assurance of contracts for defense work during 1952.
13	547,246	61.6	Have no contracts for defense work in 1952. More than half the firms are not assured of defense work for 1952. Again, most of those with contracts also make other appliances.
17	597,865	67.3	Expect to convert (or maintain) 5 to 50% of production facilities to defense in 1952.
8	239,813	32.7	Do not expect to convert to defense activity. Consensus: Indications are that 31% of these facilities are now converted, or will be converted to defense in 1952. This would be 21% of the total reported. Apparently, while several firms do not have assurance, they do anticipate defense work during 1952.
-	764,874	86	Anticipate a break-even point of 78.8% of 1951 production (no defense contracts considered).

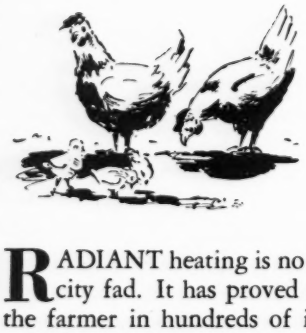
No. of Mfrs.	Estimated 1951 Shpts.	% of Shpts. Reported	FLOOR FURNACES: 18 manufacturers, who shipped 153,998 units, 55% of total, reported:
-	35,726	23.2	Expect business to increase 10 to 50% in 1952.
-	56,172	36.5	Expect business to decrease 15 to 50%.
-	62,100	40.3	Expect no change in volume of business. Consensus is that sales will be slightly (5%) under 1951 level of 230,000 units.
-	18,572	12.1	Expect no change in amount of advertising and promotional activity.
-	119,969	77.9	Expect a 5 to 35% increase.
-	15,457	10.0	Expect a minor decrease.
12	125,198	81.3	Assumed defense contracts in 1951.
6	28,800	18.7	Did not assume defense contracts in 1951. One-third of the companies did no defense work. They accounted for only 18.7% of the 1951 reported shipments.
10	117,929	76.6	Have contracts or assurance of contracts for defense work during 1952.
8	36,069	23.4	Have no contracts for defense work in 1952. 44% of reporting companies did no defense work. They accounted for 23.4% of shipments. Smaller companies then apparently have no assurance of defense work for 1952.
12	117,179	76.1	Expect to convert (or maintain) 10 to 50% of production facilities to defense in 1952.
6	36,819	23.9	Do not expect to defense activity. Consensus: Indications are that 26% of these facilities are now converted, or will be converted to defense in 1952. This would be 20% of the total reported. (Assuming production and shipments equal.)
-	123,822	80	Anticipate a break-even point of 79.2% of 1951 production (no defense contracts considered).

Last Month. *Part I of this two-part article described three growing applications of radiant heating —in churches, in schools, and in garages.*

RADIANT HEATING Part 2

In Poultry Brooding, Hangars, Hospitals . . .

By OSCAR SHEFLER



Poultry Brooding. *Radiant heating has moved to the chicken house, where it's paying for itself in operating economy and healthier birds.*

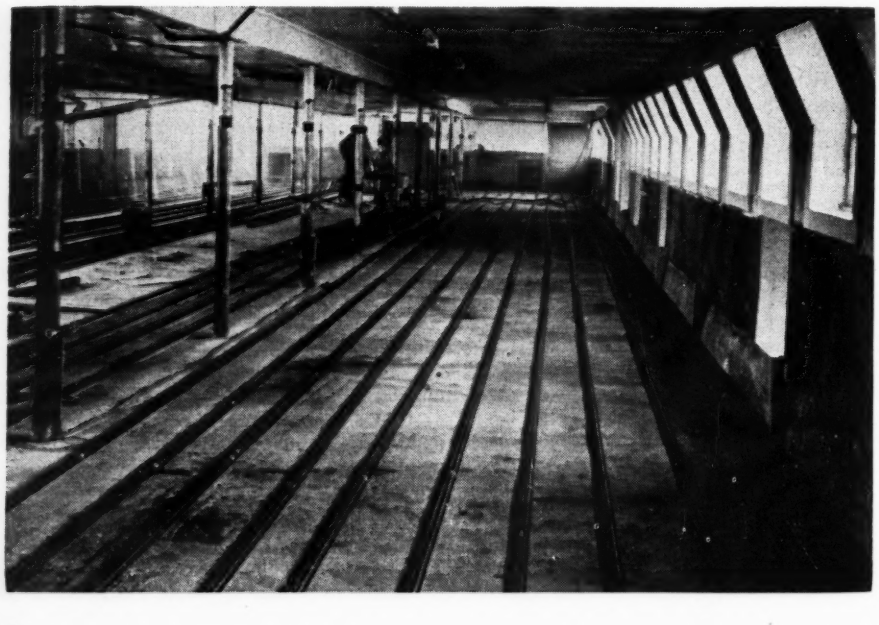
RADIANT heating is no longer a big city fad. It has proved its worth to the farmer in hundreds of installations, including mushroom farms, greenhouses, and cattle breeding barns.

Probably its greatest use in agriculture, however, has been in poultry raising. The new trend is so significant that a European poultry journal, *Cocoricos du Monde,* recently wrote to the Byers company asking for information to be used in a forthcoming review of outstanding developments of the half century in the field.

The reason for the success of radiant heating in brooder houses can be seen in the reports of producers, queried in a countrywide survey, some of whom claim that their savings, both in the health of their birds and in operating economy, have been enough to offset the initial cost in the first year of operation alone!

The major advantages they report are:

1. A cut in mortality rates, to as low as 1 to 2%.
2. Reduction or complete elimination of coccidiosis.
3. Healthier, heavier birds, with resultant improvement in market prices.
4. Utilization of the entire floor area, so that the number of birds per sq ft has been increased as much as 50%.
5. Elimination of deaths and injuries due to crowding.
6. Reduction in fuel and labor costs by as much as 50%.
7. Reduction in brooder house cleaning costs by as much as 80%.
8. Lessening of fire hazards, accompanied by a drop in insurance rates.
9. Ease of operation, both as to handling the heating equipment and caring for the birds.
10. Saving in the amount of litter needed.



The owner of this capon brooder house in Pennsylvania remodeled his two houses and switched from hover-type to radiant heating. Heating costs were reduced by two-thirds.

In Pennsylvania, the owner of a capon brooder house was dissatisfied with the hover-type heating he had been using. Accordingly, he remodeled his two houses—one of two stories and one of three—to incorporate radiant heating. The three-story house is 115 x 36 ft and the two-story house, 110 x 20 ft. The two buildings are joined, forming an L.

One-inch insulating board was laid over the existing wood floors and ap-

proximately 14,000 ft of 1¼-in. and 1000 ft of 2½-in. pipe were embedded in a 3-in. concrete slab. The 1¼-in. pipe was fabricated into sinuous coils with parallel runs spaced about 12 to 13 in. apart. This pipe size and spacing were selected on the basis of calculated total heat losses for the building: 300,000 Btu per hour at an outside air temperature of zero.

Hand valves are used to regulate floor temperatures, so as not to exceed 90° to 95° when the temperature outside is zero. This is done by keeping water temperature at the boiler at 160°. Room air temperature 18 in. above the floor does not exceed 85°.

The owner keeps careful records and has found that his heating cost over a given period of the year runs 80 cents per 100 chicks, as opposed to a former cost of $2.50 per 100 chicks under the old hover-type heating.

In another Pennsylvania installation, the owner had an opportunity to observe the difference in effectiveness of radiant heat and another type of heating. A few years ago, a great snowstorm hit the Eastern seaboard and the power supply at the farm was cut off for 27 hours. As a result, all heat for the brooder houses was shut off.

In the ordinary brooder houses, 250 valuable "pedigree" chicks froze to death. Those in radiant brooder houses, however, came through unharmed. The reason was that thermal energy stored in the concrete slab by the wrought iron pipes provided enough heat to keep the chicks from freezing.

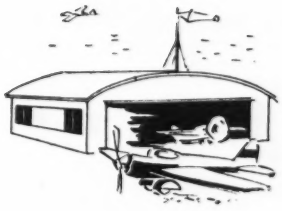
In 1945, the owner of a turkey farm in Burlington, Vt., decided to try radiant heating in his brooder house, a two-story building measuring 122 x 35 ft. The cost, installed, was $4800, representing an investment of 57 cents per square foot of floor area.

The building is of frame construction with 1-in. wood siding and building paper covering each side of the studding. Space between roof studding is filled with wood shavings to reduce heat losses. Ceiling and outside walls have a coefficient of .1 Btu/hr/sq ft/° F.

Piping embedded in the first floor consists of an arc-welded grid of 1¼-in. wrought iron pipe on 12-in. centers, laid on fill and covered with 1 in. of concrete. The second floor system consists of grids of 1¼-in. pipe on 9-in. centers, embedded in a 3-in. concrete slab on a 1-in. rough wood floor supported by open joists. Downward heat flow from the second floor grids was calculated to be 30% of the upward component.

The owner reports that he has been able to market 5 to 10% more birds from his turkey flocks because the radiant heating system provides draftless warmth that cuts down flock mortality.

The uniform floor heat has eliminated "piling up" of the birds, he adds. Also, one man is able to take care of more birds than was formerly possible with either the permanent or colony brooding system. Cleaning the pens is easier because the litter is dry and there are no exposed heating units to make cleaning difficult.



Hangars. *Faster engine starting is just one advantage of radiant heating in big, barnlike aircraft buildings.*

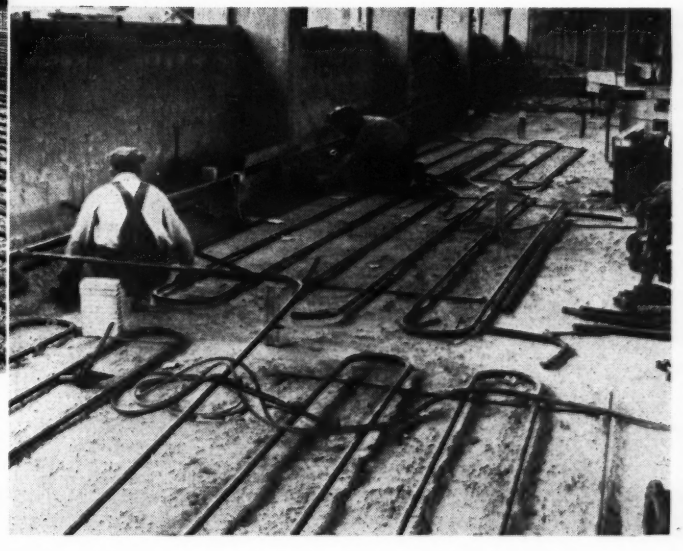
MANY of the problems attached to the heating of garages apply on a still larger scale to the heating of aircraft hangar buildings. There are the enormous doors which must be opened many times a day. There are great overhead spaces which take a lot of the effectiveness out of convection heating. And there are the vast floor spaces which must be heated to make work possible in cold weather.

Radiant heating is especially suitable for these structures because it is easily adapted to the requirements of an extensive, unbroken area of floor.

In Dallas, the operators of one airline included radiant heating in the design of their new hangar building. The floor space covered represented an area of more than three-quarters of an acre. To service this area, more than 20 tons of wrought iron pipe were used. A further advantage of the system is that aircraft engines are maintained at room temperature for quick and easy starting.

More than three-fourths of an acre of floor space is covered in this Dallas hangar. Large, unbroken floor areas and constant opening of enormous doors create requirements particularly well handled by radiant heating.

Possibly the largest radiant heating system ever designed for a hospital was installed recently in a Michigan state hospital project. More than 110 miles of 1-in. wrought iron pipe was used.



Hospitals. *One Michigan institution has installed 600,000 ft of piping in what is thought to be the largest system ever built.*

RECENTLY, what is reported to be the largest radiant heating system ever designed for a hospital was installed in Michigan. Approximately 600,000 ft of 1-in. wrought iron pipe, more than 400 tons, were used.

The radiant heating system is designed to produce approximately two-thirds of the necessary heat. The balance is made up by a ventilation system taking heat from steam coils.

Radiant heat is controlled by means of outdoor thermostatic equipment regulating the water temperature, and indoor zone thermostatic equipment operating zone pumps. There are five zones in the nine-story medical unit, each served by a converter through which water and steam pass for heat exchange. Three other converters are provided, for the ground floor, third floor surgery wing, and the top floor.

Each of the five zones on each floor has its own floor-zone hot water pump discharging into the return side of the vertical circulating mains. It circulates hot water from a vertical circulating main through the horizontal perimeter supply main, the headers to several radiant heat panels in the floor, and the return main.

Another hospital project illustrates the adaptability of radiant heating to a specialized function. The hospital contains 30,000 sq ft of floor surface divided into four heating zones, one for each wing. Hot water for the floor coils is supplied through a 425-gpm converter designed to handle a 20° water temperature drop, from 135 in supply mains to 115 in returns. Steam for the converter is piped at 25-psi pressure from the central power plant through a 5-in. main in a 15-in. conduit lined with mineral wool. The conduit also contains a 2-in. condensate return.

Four 2.5-in. supply mains run from the converter through pipe tunnels to the four heating zones. Individual 100-gpm circulator pumps, pumping against a 50-ft head, are installed on each circuit. The return mains, also 2.5-in., run to a small partial basement under the building's central portion, which houses heat exchanger and circulator pumps.

Sinuous heating coils were selected because of the small size of individual rooms and wards, and because of ease of fabrication. These coils, all fabricated on the site on a special bending tool devised by the heating contractor, were made of 1¼-in. wrought iron pipe spaced on 12-in. centers. The coils were laid on a 4-in. concrete slab fill, covered with waterproof paper. Structural reinforcing rods were used in the concrete slab and a 2-in. terrazzo floor was laid on the concrete.

Supply lines from the mains to individual-room coils run adjacent to the exterior walls of the rooms, so that the hottest water reaches these cold areas first. These were tapped with balancing cocks to regulate water flow, thereby controlling heat input into each room. Once adjusted for desired comfort, the cocks do not have to be regulated during the heating season. Ordinary room-air thermostats control water temperature.

• Conclusion

ALTHOUGH these six types of buildings—churches, schools, garages, poultry houses, aircraft hangar buildings, and hospitals—represent unique requirements for the application of radiant heating, the principles involved in designing the installation are the same for each.

Once the location of the piping has been determined, the design problem is easily broken down into four major steps:

1. The first step is the calculation of the heating load. This differs from conventional practice only insofar as the structural section—usually the floor or ceiling—in which the coils are to be placed is concerned. The loss through these sections away from the space to be heated is known as reverse loss.

For ground slabs, the reverse loss allowed normally ranges from 10 to 30% of the losses from all other sources. The minimum occurs in a warm climate with a low ratio of exposed slab edge to floor area; conversely, the maximum occurs in a cold climate with a high ratio of exposed edge to floor area.

2. Once the heat load in every partitioned area is known—and every such area should have its own valved piping element— the next step is selection of the water temperature for the system, the pipe size, and the spacing. In general, water temperature will be in the range from 120 to 140°. The pipe will generally be ¾-, 1-, or 1¼-in., being placed on centers ranging from 9 in. for the smaller size to 24 in. for the larger ones.

Main sizes are normally governed by a predetermined maximum frictional resistance to flow and maximum allowable velocity of flow.

3. With the main and room piping designed, the piping layout is readily completed by carefully selecting the location of balancing valves and vents. The first is handled simply by equipping each coil or grid with its own control valve—either in a valve box in some inconspicuous place or on a separate supply or return line in the boiler room.

Venting practice is governed by the same fundamental principles that exist in any water system. A sufficient quantity of trapped air collecting at a high spot in a relatively level system will tend to block water flow; consequently, one or more such high spots should be created and properly vented. Any change in elevation of piping should also be vented, while standard venting practice in the boiler room should be followed.

4. With the piping layout thus completed, all that remains is the selection of auxiliary equipment. Contrary to some opinion, there need be no new set of rules for sizing of boiler and circulator and the specification of controls for a radiant heating system. Each unit may be selected in the manner customary for all forced hot water work.

Preparing Milwaukee For Gas Househeating

1. Surveying System for Pressure Boost

By NORMAN BURZLAFF

This three-part series is adapted from papers presented at the Wisconsin Utilities Assn. technical and sales convention held in Milwaukee, Nov. 14-16. The authors, all associated with Milwaukee Gas Light Co., tell how that company prepared for taking on large numbers of gas househeating customers.

THE introduction of natural gas to the city of Milwaukee early in 1950 brought with it a great increase in the use of gas for househeating and industry. With a distribution system designed with mains that ranged in size from 3- to 12-in. with a 6-in. pressure, coupled with the fact that a large part of the system was in need of cleaning, this increase created a problem.

To clean all these mains or replace them with a larger size would mean a costly construction program which would take many years to complete. The only remaining solution was to increase the pressure in the low pressure system.

On Dec. 6, 1949, Milwaukee Gas Light Co. began taking applications for househeating and industrial use. During the first few months of 1950, with applications coming in at a rate of only about 25 a day, it did not appear that Milwaukee would become a real gas-heated town. In the months that followed, however, this picture changed completely, applications hitting 75 a day.

As these applications were processed by the distribution design department, each was posted on a map. By this method we could see where the heating load was to be the greatest. To our surprise, the trend to gas heat was almost as great in the older sections of town as it was in the newer sections.

With this househeating map before us, we first began to make a pressure survey of the sections of town where we thought we would have trouble. This pressure survey was then extended to the entire city. All pressure recordings taken were then posted on a map. From this map we could then begin our pressure elevation program.

The next step in this pressure elevation program was to lay a plan of areas to be isolated. Just a year before, the distribution department had sectionalized the entire city into 35 natural gas conversion sections. Each of these contained from 4000 to 6000 meters. All the mains surrounding these sections had been sawed and the Skinner clamps were still on the mains.

The excavations were all backfilled with gravel to provide easy reopening of these cuts. By using these same sections we estimated we could save about $100 per blind installation. With the amount of labor and material that could be saved in using the natural gas conversion sections, our plan was then to use these same sections for our elevation program.

We next began to prepare a cost estimate for all labor and material to be involved and arrived at the following: service regulator installation, $25 per service; blind installation, $200 each; pilot load district regulators, $200 each; leak survey after pressure elevation, 70 cents per service tested; and new district regulators, wherever it was necessary to install them, $3500 per installation. This cost breakdown was then submitted to management.

An order was issued directing us to pressure elevate an area that would contain 60,000 services, this to be broken down into several smaller sections. As test sections, we started out with divisions of 100, 1000, 2000, and 5000 regulators. This was done to enable the service shops to school elevation crews.

Each pressure elevation area was now given a number. A separate proposal sheet was drawn up for each section, this including the following information: boundaries of the section, number of services, number of blinds or valves to install, number of district regulators to pilot load, exact location of each blind or valve, and location of each district regulator, together with a map showing all boundaries, blind or valve locations, and regulator pits.

Shop crews were then organized and regulator installation began. This latter phase of the program is discussed by the supervisor of pressure elevation in the second part of this presentation.

When the city was sectionalized for natural gas conversion, blinds were installed only on 4- and 6-in. mains. All larger mains had valves at point of section boundaries. With these valves installed in the larger low pressure headers, the problem of keeping a good supply of gas in a pressure elevation section while all 4- and 6-in. blinds were being installed was not too great a problem.

When word was received from the supervisor of pressure elevation that the shop crews had completed installation of service regulators in a given pressure elevation section, we began to prepare for elevation day. The street department was then notified to begin installation of all blinds and to pilot load all district regulators in this area.

On the day of pressure elevation as the crews began to close the valves on the low pressure feeder mains, pressure was increased on regulators to 12 to 15 in. Pressure was held at this level for several weeks so that any regulators that had been missed could be detected by the consumer having excessive pressure. The main and service inspection crew checked for leaks and the street department was able to repair any leaks detected.

To date we have elevated four small areas and four large areas. In these eight areas, we have installed approximately 22,600 regulators. Pressure ranges in these areas from 20 to 37 in. As the load increases, we will be able to raise pressures to meet the demand up to a possible maximum pressure of 2 lbs.

Preparing Milwaukee
For Gas Househeating

2. Procedure for Installing Regulators

By J. LEVENDUSKY

IN preparing for the job of elevating pressures, our engineering department first determines what areas of the city are in need of elevation. Wherever possible, these areas are laid out to coincide with our natural gas changeover areas.

This gives us an area on which we have already tabulated such information as number of services; number of domestic, commercial, and industrial customers; blind and valve locations; and many other important details about the area. The average area requires approximately 10,000 regulator installations. The engineering department furnishes the service shop with complete maps, valve, blind, and district regulator locations of the area to be elevated.

In order to keep our costs at a minimum, we use as many mass production principles as possible. For simplicity and ease of installation we designed four types of regulator packages. Packages 1 and 2 (see *Fig. 1*) are used on single 5 lt and 10 lt meter connections, respectively. The packages are installed above the rigid bar after the old brass cock connections have been removed.

Packages 3 and 4 (*Fig. 2*) are installed in the service riser, package 3 in the 1¼-in. riser and package 4 in the 1½-in. riser. Both are used on multiple meter installations. The use of Dresser adapters in the No. 3 and No. 4 packages greatly reduces the installation time.

Assembly and Test

All the packages are assembled by hand and tested in the service shop. Production is eight units per man-hour. This includes badging of the regulators, handling of material, testing packages, etc. Past experience has indicated that our assemblies can be used approximately 82% of the time without any additional refit work being done to the riser or meter connections.

For ease of installation and to reduce space requirements we use a two-piece regulator in our units. This type of regulator will also reduce maintenance costs, because replacement is a simple operation.

Upon receiving notice from the engineering department to elevate a particular area, the pressure elevation department has governor set orders printed of all customers located in the area. These orders contain the following information: (1) work order number, (2) type of customer (i.e., domestic, commercial, or industrial), (3) meter size and number. Two copies of each order are printed, one for the field work and the other for the office file.

First, a Survey

One of the first steps in preparing to elevate a section is to have it surveyed. Survey routes are compiled by the office and dispatched to the survey crews. In the compiling of routes a small "X" is marked on the map for each address dispatched. The routes usually cover one square block, and every house in that block is canvassed.

The survey man determines the type of package to be set and delivers the package at the time of inspection. If the job has to be refitted he marks the orders accordingly. The orders are then returned to the office and separated according to package jobs and refit jobs. From this file routes are made up for the governor installation crews.

Our installation crews are of two types—foot crews which install packages and refit crews which handle all nonstandard installations.

Orders are issued to the foot crews in such a way that a crew works from house to house away from the district regulator. This pattern is followed to insure an adequate supply of gas to our customers. If the pressure drop through the house regulator is excessive, the district regulator out-pressure can be raised enough to compensate for the loss without affecting service further down the line.

In cases where the load is exceptionally heavy, we install a regulator by-pass for use during the interim period from the time the governor is installed to the time of elevation. This pattern was followed more rigidly during the winter months because of heavy heating load.

Close Control

All crews work within a few blocks of each other, which increases our control over them. This setup also helps our supply problem, since the supply trucks are within walking distance of the crews. On occasions the crews have become dispersed, but this does not present a problem because the supply truck is radio equipped. The crew in need of material calls the dispatch board which, in turn, dispatches the supply truck to the crew. Radio communications help immeasurably in this respect.

Our refit trucks are supplied each night by the shop storeroom. All material used during the day is replaced by our truck loading team. This eliminates some of the time spent in the shop by the refit crews and increases production. To eliminate as much paper work as possible, our office clerks compile payroll time sheets for the foot crews. Material requisitions are also eliminated for the foot crews. All material that is needed is charged directly to the area by the supply men.

When installing a pressure regulator, the serviceman goes to the rear door if possible. He identifies himself, states the reason for his call, and then asks permission to turn off the gas for an hour or so. In his preliminary investigation the serviceman makes sure that all me-

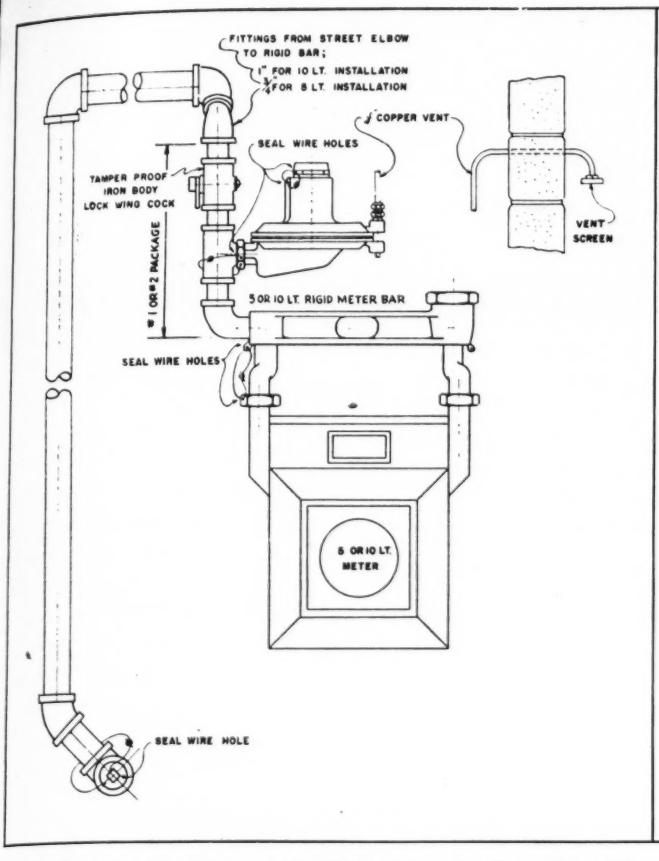

FITTINGS FROM STREET ELBOW TO RIGID BAR;
1" FOR 10 LT. INSTALLATION
¾" FOR 5 LT. INSTALLATION
¼" COPPER VENT
SEAL WIRE HOLES
TAMPER PROOF IRON BODY LOCK WING COCK
#1 OR #2 PACKAGE
VENT SCREEN
5 OR 10 LT. RIGID METER BAR
SEAL WIRE HOLES
5 OR 10 LT. METER
SEAL WIRE HOLE

Fig. 1. Governor-single meter installation is made above the rigid bar after old brass cock connections have been removed.

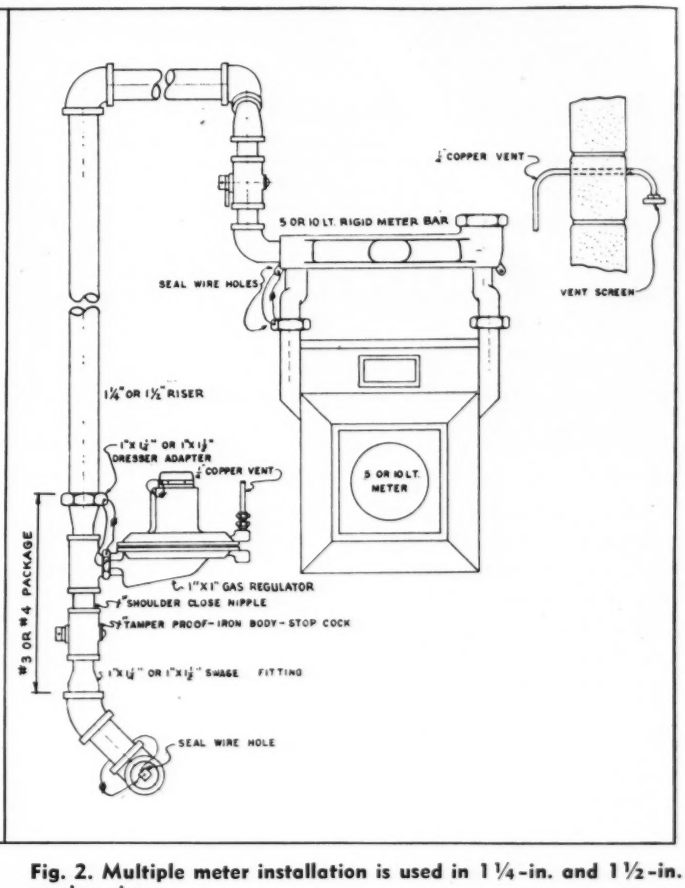

¼" COPPER VENT
5 OR 10 LT. RIGID METER BAR
VENT SCREEN
SEAL WIRE HOLES
1¼" OR 1½" RISER
1"X½" OR 1"X1¼" DRESSER ADAPTER
¼" COPPER VENT
5 OR 10 LT. METER
#3 OR #4 PACKAGE
1"X1" GAS REGULATOR
¾" SHOULDER CLOSE NIPPLE
¾" TAMPER PROOF-IRON BODY-STOP COCK
1"X¼" OR 1"X1¼" SWAGE FITTING
SEAL WIRE HOLE

Fig. 2. Multiple meter installation is used in 1¼-in. and 1½-in. service risers.

ters are accessible. He then turns off all gas appliances supplied by the meter, determines if the service clean-out tee is accessible, and checks the condition of the service at the building wall. After taking proper safety measures, the serviceman proceeds with his work.

When a package is being installed, the gas is shut off at the curb and at the meters. The package is then installed, and the service line is tested to 8 or 10 lbs pressure. While the fitter is putting in the governor, his helper is running the vent, usually ¼-in. copper tubing. After the job is completed, service to the house is restored.

All completed governor set orders are tabulated as to the type of governor, time required to install, number of packages, and number of refit jobs. After tabulation, the information is transferred to the duplicate copy, which is then sent to the accounting department for processing.

The field copy is then used to check off the service from our map. This check-off is extremely important. The "X" with which the service has been marked, to indicate that an order was issued for that particular service, is circled when the job is complete. Before elevating, every service on the map is checked to make certain that all the "X's" are circled. This procedure has proved to be very effective; only 13 services have been missed out of approximately 23,000.

After the maps and orders have been thoroughly checked, the distribution department is notified that the area is ready for elevation. The following procedure is used to elevate approximately 10,000 services from 7 to 16 in. w.c.

Four Districts

The elevation area is divided into four districts. To each of these districts we assign two supervisors, two governor installation trucks, and two service radio cars. Each unit operates within its own boundaries. All customer calls pertaining to pressure elevation work such as services missed, excessive pressure, leaks, etc., in the district are handled by the units. All units are controlled from a central clearing station located in the area. The station is composed of personnel from the distribution, industrial, and customer service departments.

District governors are boosted one at a time at half-hour intervals. From the time the first one is elevated, pressure readings are taken inside and on the fringe areas every five minutes and recorded. As each regulator is boosted, this information is transmitted over the radio, so that everyone engaged in the elevation program can know exactly what is happening as it occurs. Here the use of radio communications simplifies the work tremendously.

Our overall plan calls for the installation of approximately 100,000 house regulators. This program covers the entire city with the exception of the downtown area. At present we have completed 23% of the program with very good results. In the elevated areas we no longer have to clean mains and our supply is more than adequate for the increased load.

Our average cost per installation is $23.30. This includes labor, material, transportation, etc. The ¾-in. governor (above the rigid bar) installation costs $19.21. The 1-in. governor (in the riser) costs $22.43, and the non-standard or refit jobs cost $28.26 to install. Compared with the results obtained, these costs are more than justified.

At present our pressure elevation department is operating as a manpower cushion. Whenever the request for service from our customers drops, the excess personnel is absorbed by pressure elevation. We find this to be a very favorable means of utilizing the personnel to best advantage.

Preparing Milwaukee
For Gas Househeating

3. Revising State Heating Regulations

By R. G. KOCH

WITH the advent of natural gas in Wisconsin, spaceheating with gas enjoyed a tremendous demand, not only for residential jobs, but also for commercial and industrial uses.

One of the most favored types of heating appliances in the latter field is the gas-fired unit heater. The heating industry soon found, however, that unit heaters often were restricted in application due to provisions of the Wisconsin Heating & Ventilating Code, a code which was written some years ago at a time when commercial and industrial gas-fired heating played a minor role. Consequently, gas-fired equipment was not thoroughly considered when formulating the code.

Committee Named

Recognizing this situation about one year ago, John C. Bolender, then the chairman of the Wisconsin Utilities Assn. gas section, appointed a special committee to cooperate with a committee already appointed by the Wisconsin chapter of the American Society of Heating & Ventilating Engineers. The latter group, with Otto Ress as chairman, was considering recommendations for revision of the Wisconsin Heating & Ventilating Code.

Appointed to the utilities committee were, in addition to the writer, Gordon Head of Wisconsin Natural Gas Co., C. E. Lageman of Wisconsin Public Service Corp., and Harris Ide of Wisconsin Southern Gas Co. After a number of joint meetings with the American Society of Heating & Ventilating Engineers committee, proposed revisions were formulated and presented to the industrial commission in May. The committee was promised that consideration will be given to its recommendations when the heating code is revised. Work on revision of the code is expected to start before the end of this year.*

*1951.

TABLE 1. Maximum Percentage of Outside Air to Give 30° Inlet Mixture

Indoor Design	Outdoor Design Temperature —14°	—24°	—32°
50°	31.3%	25.3%	23.0%
55°	36.2%	31.6%	28.8%
60°	40.6%	35.8%	32.6%
65°	44.3%	39.4%	36.1%
70°	47.6%	42.6%	39.2%
75°	50.6%	45.5%	42.1%

As already indicated, one of the main projects for the committee was the subject of code restrictions on unit heaters. Heating contractors often stumbled on the rather odd question, "When is a unit heater not a unit heater?" The answer to that one is: "When it is a furnace." Now for commercial uses a fire resistive enclosure must be provided for a furnace or boiler, whereas the gas-fired unit heater is often exempt from this provision.

In the absence of clear definitions, a unit heater was classified as such only as long as no ductwork was attached to it. In many cases, consequently, a few feet of ductwork would create an expense for a fire resistive enclosure many times the cost of the unit heater installation. The committee met this problem by submitting definitions for unit heaters, both propeller type and blower type.

These definitions incorporated specifications that permit the heater to be installed in or adjacent to the space to be heated, and to be equipped with face extensions. Face extension was also defined as a "duct the full size of the unit heater outlet, not over 6 ft long, including an offset or elbow." In this manner, the unit heater retains its identity even though it has a little ductwork, and thus can remain exempt from the requirement of a fire-resistive enclosure.

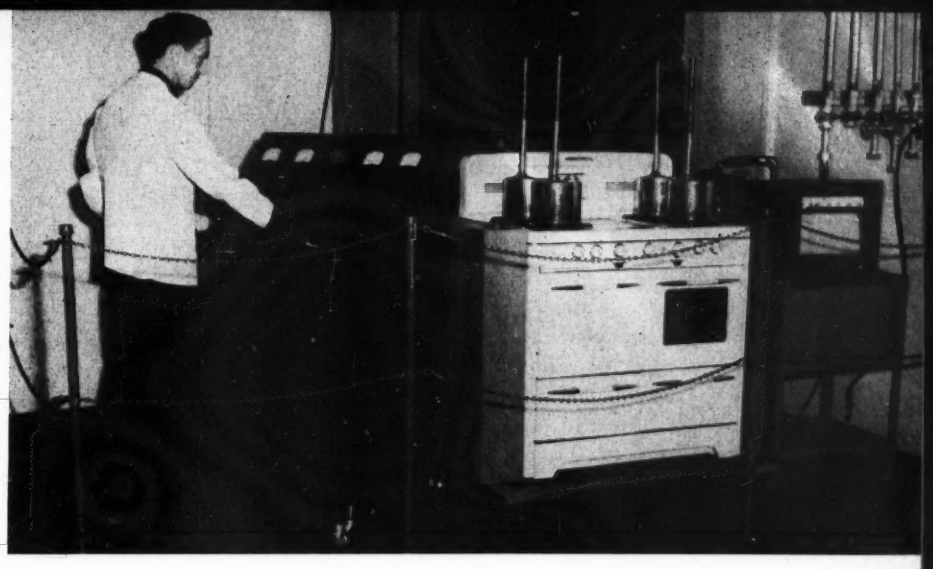
Suspended furnaces where approved by the industrial commission may also be exempted from enclosures if order No. 5210 of the building code is revised as presently contemplated.

Another problem involving unit heaters is the size of the inlet air mixing chamber. Again, by definition, specifications were submitted limiting the maximum velocity to 500 fpm, and permitting a maximum length of 20 ft for the inlet duct.

Outside Air

So much for unit heaters. A recommendation relating to the use of gas-fired equipment for tempering outside air was also embodied in the committee's work. The heating and ventilating code required the introduction of outside air for ventilation on commercial and industrial jobs. Passing sub-zero air through gas-fired equipment may not only cause condensation of the flue gases in the heating unit, but will also result in uncomfortably cool discharge air. A minimum temperature of 30° for inlet air was recommended. *Table 1,* which indicates the maximum percentage of outside air to be mixed with recirculated air to obtain 30° F, was also submitted. This table is designed for the various combinations of indoor and outdoor design temperatures encountered in Wisconsin.

Another phase of gas-fired heating in commercial and industrial applications which lacked specifications is that relating to proper provisions for combustion air. Too often, the need for combustion air openings is forgotten or not recognized by the installer of the gas equipment. Incomplete combustion and dangerous conditions can result from such an oversight. Where it was kept in mind, the installer often did not know how to calculate the size of opening required. The recommendation of the committee stated, in part, that "an opening to the outside air be provided having a free area of ½ sq ft or more for each 1 million Btu per hour of fuel burned."



Technician uses electrical test bench in applying proof voltage and leakage tests to a gas range carrying electrical components.

By FRANK FIEDLER JR.
Pacific Coast AGA Laboratories
Los Angeles

New Electrical Tests in Gas Appliance Standards

AMERICAN standard approval requirements for gas-burning appliances have recently been expanded to include performance tests defining in detail previous constructional specifications for electrical assemblies forming an integral part of gas-burning appliances. These additions are important to the gas industry since they clearly show electrical inspectors or other enforcing authorities what electrical performance can be expected of gas appliances equipped with electrical accessories.

Approval requirements for various types of gas-burning appliances have, for many years, included construction features based on the national electrical code, covering the electrical components with which a gas appliance may be equipped. These specifications seemed to serve the needs of the public and the industry satisfactorily, but due to the increased use of electrical circuits on gas appliances it became apparent that the constructional provisions should be augmented by performance tests clearly setting forth how to determine compliance.

Lab Goes Into Action

The AGA Laboratories consequently took immediate action to devise suitable methods of test procedure, obtain necessary special instrumentation, and keep requirements groups advised of all developments so that requirements revisions could be made at the earliest possible date. In order to develop performance tests quickly and to have assurance of their validity, the aid of combination gas and electric utilities and of such organizations as Underwriters' Laboratories and Electrical Testing Laboratories was solicited. Progress was greatly expedited through the cooperation extended by representatives of these organizations.

Such cooperation was essential to our program, which places great reliance on listings of electrical components promulgated by qualified laboratories. Full recognition is given to functions and responsibilities now covered with great competence by Underwriters' Laboratories or other nationally recognized testing agencies. Otherwise duplicate testing facilities would be required and in many cases duplicate testing expenses incurred by the gas appliance manufacturer.

The additional performance tests now included in requirements are essentially means to determine whether or not adequate dielectric has been interposed between current carrying parts and those parts of the appliance which persons can touch. Thus, they represent detailed procedures of how to determine whether or not an appliance complies with a similar construction provision based on the national electrical code, which has formed part of appliance requirements for many years.

These performance tests, applicable to all types of electrical components for determining operational safety, are essentially checks on the quality of the circuit insulation. Along this same line, it has long been required that insulation of wire be suitable for the temperature to which it is exposed. Now procedures have been included outlining how to determine whether or not the application is satisfactory.

Aside from deterioration of insulation due to temperature alone, two major properties of electrical insulation must be determined under the new provisions. Inadequate insulation may allow very small currents to flow from an energized conductor to the frame of the appliance. Any appreciable amount of such current may cause the parts of the appliance to become charged, resulting in an electrical shock hazard to the user.

Leakage Currents

Such currents are called leakage currents because they "leak" from a part of the circuit at high potential and take a short cut through the appliance itself back to a part of the circuit at low potential. Provision has been made for measuring such currents and it is specified that they must be less than a value which causes perceptible shock sensation to human beings.

Although insulation may not "leak" appreciably, it may be so thin as not to be able to resist complete breakdown after long periods of use or when electrical potential is increased above its normal value. Therefore, the second major property of insulation now covered in detail is its resistance to complete breakdown under high potential.

The heavier the insulation, the less potential per unit thickness is imposed for given voltage, so that in one sense the "breakdown" voltage of insulation can be taken as a measure of its effective thickness. Many years of experience in the electrical industry have indicated that effective insulation thickness corresponding to 900 volts is required for

satisfactory performance and durability of circuits normally operating at 250 volts or less.

It is thus obvious that the second test to determine whether electrical assemblies are safe involves stressing the insulation with a high voltage impressed between the current-carrying parts on adjacent metal parts of the appliance. Since this test "proves" the integrity and electrical strength of insulation, it is generally referred to as a "proof voltage" test. The 900-volt, 60-cycle alternating current test potential is applied through special instrumentation to insure that insulation is evenly stressed throughout the appliance.

These two performance tests, as well as determination of insulation and electrical component temperatures, are conducted with the appliance operating under the condition of test specified for determination of wall and floor temperature; that is, under maximum operating temperature conditions. Since the appliance must be in operation in order to achieve these maximum temperature conditions, it is apparent that electrical circuits of the appliance must be energized at the same time the various tests are conducted.

To perform the tests simply and with a minimum of time and expense to the manufacturer, specialized equipment has been developed. This electrical test bench is capable of supplying an appliance under test with the nameplate voltage, measuring leakage currents with suitable microammeters in conjunction with a built-in switching arrangement, and supplying the requisite proof voltage during appliance operation. This equipment is available at both the Cleveland and Los Angeles Laboratories.

As a result of the application of these revised testing procedures, the gas industry is in a most favorable position in regard to general acceptance of the registered AGA Laboratories' approval seal. This emblem signifies that all parts of the appliance, including electrical equipment, comply with national standards of safety, durability, and performance.

Special mention may also be made of the fact that the code-enforcing authorities of one of our largest municipalities recently recognized our establishment as a "recognized electrical testing laboratory." This action greatly enhances the significance attached to AGA approval and increases in like degree its value to the gas-consuming public for whose protection our approval program was established.

Propane Air Fills In for Gas, Forestalls Line Repair Outage

By HARVIE CHAPMAN

A team of employees from Lone Star Gas Co., Dallas, last fall conducted an operation at Killeen and Fort Hood, Texas which may set a precedent for future line changes involving main line work. The "actors" that stole the show in that brief drama on Sept. 30 were two portable propane-air units which supplied Killeen and Fort Hood with sufficient pressure for more than three hours while the flow of natural gas was completely shut off.

The portable units, conceived and constructed by several Lone Star engineers, are the only portable propane-air units known to be in operation in the country. Permanent units are used in the east as auxiliary boosters and also to supply small town plants, but Lone Star, as far as it is known, is the first to utilize such a unit to avoid construction of a long main line bypass.

The situation was this. Killeen, the home of Fort Hood, has been declared a defense area and developers had begun work on a housing project which will eventually add about 1600 meters to the company's system. A 10-in. main, which intersected the property destined to become a residential area, was to be replaced by a new 10-in. line skirting the construction and tying in with the old main line just east of Fort Hood.

A main line construction crew laid the 3000 ft of new pipe in mid-September. The problem was to make the necessary cuts and welds to tie in the new section without cutting off the supply of gas to the 2100 meters at Killeen and the Fort Hood measuring station. This is not a new problem; the method used by Lone Star to solve it is.

Ordinarily there are three methods of making line changes:

1. A pipe plugging machine isolates a short section of pipe where the work is to be done and a short bypass is constructed.
2. A block-valve is closed and a bypass is laid to divert the gas.
3. The supply of gas is shut off leaving the system to operate on the storage in the line.

On this job the storage method would not carry the measuring stations while the work was being done. A pipe plugging machine was not available for 10-in. pipe, and the nearest block-valve was eight miles away at Nolanville. The block-valve could have been closed and a bypass constructed, but it would have been exceptionally long.

H. D. Portwood, chief engineer of the distribution division, suggested to R. F. Foster, manager of the Stargas

STATISTICS ON PORTABLE PROPANE-AIR UNITS

Killeen Unit

Total gallons propane used	612
Total cubic feet of mix produced (Equivalent to 55,900 cu ft of natural gas.)	37,200
Maximum pressure reached	38 lbs
Total time in use	4 hrs

Fort Hood Unit

Total gallons propane used	2947
Total cubic feet of mix produced (Equivalent to 240,000 cu ft of natural gas.)	180,000
Maximum pressure reached	30 lbs
Total time in use	5 hrs

Size of pipe on both units was predominantly 2-in., with a 6-in. pipe for a mixing chamber.

engineering department, that a propane-air substitute might solve the problem at Killeen and avoid shutting off the town and Fort Hood while the line change was made. After a meeting with T. S. Bacon, chief transmission division engineer, the decision was made to give the propane-air substitute a try.

First Unit Readied

The company began assembling the equipment Wednesday morning, Sept. 26, at the transmission shop in Dallas. Pipe, high pressure hoses, copper tubing, valves, and orifice meters were fitted together and by Friday afternoon the first portable unit was ready for trial.

A Stargas transport unreeled its hose and fed the propane while a compressor supplied the air. Valves were opened, the mixing process began, and the unit built up a pressure of 30 lbs. The "mix" was flared high in the air from the arm of a crane. Engineers worked until midnight Friday completing the construction and testing the second unit which was about four times as large as the first. The tests ran smoothly and the go-ahead was given for use of the units at Killeen and Fort Hood.

Saturday morning a Lone Star caravan left Dallas for Killeen. Included in the fleet were the two propane-air units on a truck, three 4500-gal. Stargas transports, five air compressors, and several company cars loaded with tools and equipment.

Trial Runs Successful

Shutoff time for the natural gas was 1 p.m. Sunday when the block-valve was to be closed. The units were set up, one at each measuring station. Sunday morning the engineers in charge decided to make a trial run, knowing they could revert to natural gas if the units failed. At 11 a.m. propane-air mix was fed into the systems at a pressure of 30 lbs. The Killeen unit shut down after one hour and waited for the 1 o'clock shutoff time. However, the Fort Hood unit kept its pressure constant and the natural gas remained turned off.

The block-valve at Nolanville was closed on schedule and by 1:30 the natural gas pressure gauge stood at zero. With the portable units the only source of gas, the pressure was kept steady at 30 lbs as the pipeline crews purged the main line and made the cuts.

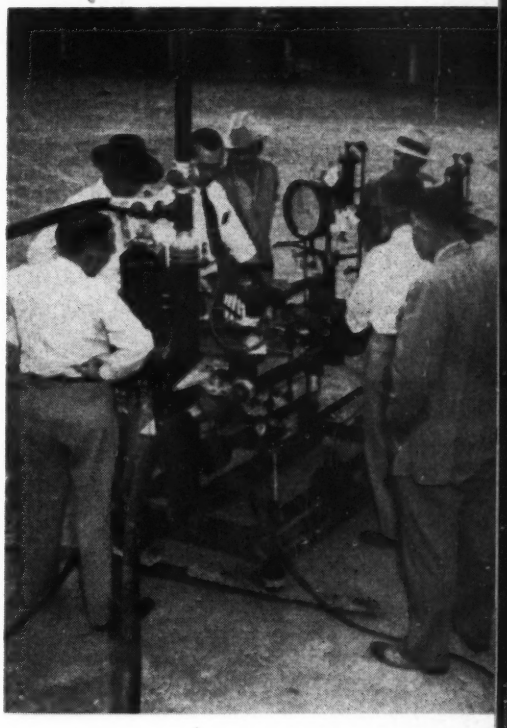
The pipeline crew finished the required six welds by 3 p.m. To test the potential of the portable units, which had operated without trouble for three hours, the engineers increased the pressure on the Killeen unit to 38 lbs. The Fort Hood unit did not reach a pressure that high, but it had been in operation more than five hours when it was shut off. When the welding job was completed, the valve at Nolanville was opened and the flow of natural gas restored. The portable units were dismantled, loaded on trucks, and on their way back to Dallas by 5:30.

That this was a new and interesting process for the Lone Star system was evidenced by the number of observers, at one time more than 30 at the Killeen station.

On Oct. 11 the larger of the propane-air units was trucked to Belton and used to supply gas for four hours while several sections of 4-in. pipe were replaced on a spur line. The natural gas supply was shut off. This time the unit was not even unloaded from the truck. The operation began about noon and was completed by 5 p.m.

Potentialities Unknown

Full potentialities of the portable propane-air units are not definite. They could be used in emergencies such as line failures. Also, as in the east, they could be utilized as auxiliary boosters during peak load periods. Their importance lies in their ability to be used quickly at any point on the system when it might otherwise be necessary to build a costly bypass line or, in a few rare instances, to temporarily cut off a town.



Outside the Killeen measuring station Lone Star engineers prepare to send propane-air mix into the city distribution system. Walter Ochterbeck, assistant chief engineer, watches orifice meters as natural gas shutoff time approaches.

Test of first portable propane-air unit commands attention of (left to right) L. D. Black, Dallas division distribution superintendent; R. E. Reading, research engineer; Fred Zapffe, control engineer; N. B. McKinney, gas measurement department; H. D. Portwood, chief distribution engineer; Dan Yarberry and D. A. Hulcy Jr., Stargas engineers; and J. A. Hayes, Dallas division shop superintendent.

Reprinted, with permission, from Lone Star Gas Co.'s *Blue Blaze*.

Sure, gas ranges are best, but . . .

Modernity Theme Is What Sells Them for East Ohio

ALTHOUGH gas range sales have held up well over the years in its territory, East Ohio Gas Co., Cleveland, has felt the inroads of electric competition in terms of a gradual but steady decrease in the ratio of gas ranges in use to electric.

Exclusive

After World War II, East Ohio, a non-merchandising utility, consistently advertised gas ranges, pointing up use-advantages such as speed, flexibility, economy, cleanliness, coolness, cooking results, etc. Despite these efforts, the competition continued to gain ground.

To find a new approach which would effectively combat electric range promotion, two questions had to be answered: What does the electric range story have that is lacking in our promotion? When both sides claim greater use-advantages, what is the quality that seems to give electric ranges the edge, in spite of our best presentation and proof of the gas story?

The firm's advertising and sales personnel and representatives of Ketchum, MacLeod & Grove, its advertising agency, held meetings, discussed the problem, reviewed consumer attitudes, and came up with a one-word answer: Modernity.

As the beginning of a long-range educational program to sell the idea that gas ranges offer the most modern, up-to-date cooking available and are up to the minuate in appearance (as well as clean, fast, dependable, and economical), the "Smart Young Moderns" campaign was conceived. Heaviest emphasis was to be placed on modernity rather than use-advantages.

Established promotions such as the firm's 5-day-a-week television show, "The Women's Window"; home service department demonstrations; display floor exhibits; and advertising and promotion by range manufacturers and dealers, supported by East Ohio's "one-third co-operative advertising allowance,"* were continued with the new campaign.

To appeal to women, fashion-type illustrations were decided upon for the Smart Young Moderns program, which was first used in 1950. Using a "follow the leader" psychological approach, the theme was set as "smart young moderns are cooking with gas." The basic campaign was contained in a series of six newspaper ads, each dominated by a large illustration of a young matron using some "economical luxury."

Copy on one ad, for example, began: "Smart young moderns live in luxury for little. Your possessions must be good looking, yes . . . but practical, too. So your plans feature a hard-top convertible in the driveway . . . and a beautiful new gas range in the kitchen." The illustration included a Chevrolet Bel-Air, for which a credit line was given. Other tie-ins were a Henry Rosenfeld dress, Drexel Precedent furniture, modern pottery, flying, and rail transportation.

In each case, very brief copy drew the analogy between the economical but up-to-the-minute gas range in the young matron's kitchen and the feature of modern living illustrated. Another tie-in was achieved with a small illustration showing the young woman at her gas range in the same pose as in the main picture. The range itself was purposely subordinated to increase readership.

Even East Ohio's standard signature was abandoned temporarily, and the company name on these ads followed the style of the headlines.

The theme and style of these ads were then adapted to smaller newspaper ads, 24-sheet posters, painted boards, car cards, window streamers and counter cards, truck signs, and miscellaneous publications. Every range dealer in the company's territory received — from sales contact men who made personal calls — a kit containing samples of campaign advertising and a broadside covering suggestions for tying in. Dealer cooperation was excellent.

Timed to coincide with national drives and AGA's fall range promotions, the campaign began on Sept. 25, 1950, and lasted for seven weeks. Newspaper advertising was staggered in daily and weekly papers so the six large and three small ads prepared represented a continuous barrage of advertising in some 33 newspapers. Campaign theme posters and car cards were used for two months. As an extra, the Smart Young Moderns theme was introduced in radio commercials on East Ohio-sponsored broadcasts of all Cleveland Browns football games.

In addition to the media mentioned, East Ohio used a mobile unit which makes periodic visits to all towns served. Labeled the "Cooking Caravan," this is a widely publicized activity of the home service department and was another means of spreading the Smart Young Moderns idea.

Since the campaign was undertaken primarily as a long-range program, it was not counted on too heavily as an immediate sales booster. However, manufacturers shipping into East Ohio's territory reported an increase of 17.5% in the fourth quarter of 1950 over the fourth quarter of 1949. This was considered a very satisfactory showing, particularly in view of the facts that the Korean war had brought on allocations and the company had also conducted a range campaign in the fall of 1949. During 1950 the company's dealers sold 55,000 ranges, 21,000 during the fall campaign.

Beyond sales results, the campaign met with wide interest and acceptance, presumably because of the unusual and attractive fashion-type approach. The company received favorable comments from a number of disinterested sources such as customers, department stores, and advertising men, and the drive was publicized in two issues of *Retailing Daily*.

In 1951, it was decided that the Smart Young Moderns theme warranted continuation, so a new series of ads was prepared. Five ads, using the same fashion approach, stressed five advantages of gas — cool, thrifty, fast, clean, and sure — that make it first choice with young housewives.

Additional aids prepared by the utility again included billboards, interior and

* East Ohio will pay one-third of the advertising cost for any dealer in Cleveland who wants to promote gas appliance sales, and the offer is good throughout the year. Furthermore, through arrangements with financing agencies, the company will add installment payments for new ranges to customers' monthly gas bills.

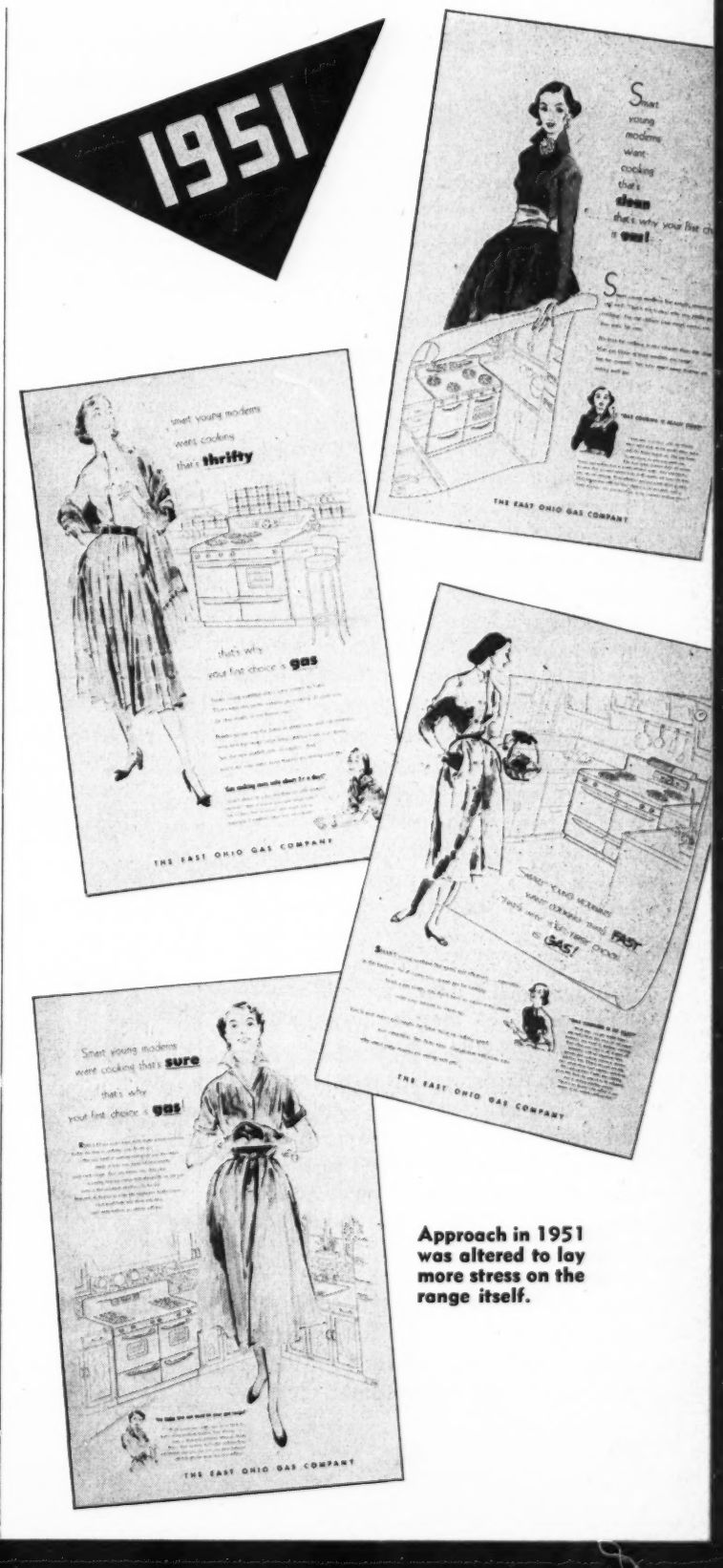
exterior bus and streetcar cards, 454 "Day-glo" signs on company trucks, 900,000 post card messages sent out with gas bills, in-store window and wall displays and counter cards, and a daily TV show which reached an estimated 50,000 women.

Kits for 1951 urged individual dealers to make the most of the Smart Young Moderns campaign in the following ways:

1. Don't let sales prospects stimulated by East Ohio's campaign go elsewhere. Tie in with ads, direct mail, and television spots using your own signature.
2. Stretch your advertising dollar with the cooperative advertising plan.
3. Review gas range selling points with your staff, especially those advantages pointed up by East Ohio's advertising. Ask a manufacturer's representative to give your salesmen a brush-up.
4. Make display pay by giving ranges a good break during campaign weeks. Stamp your place of business as headquarters for the most up-to-date ranges.
5. Use your own pet selling gimmick. A promotion stunt tailor-made for your community will build store traffic, and store traffic turns into sales.
6. Canvass your territory to find new prospects. Use East Ohio's "prospect finders" direct mail postcards.
7. Sell with demonstration. East Ohio's home service department will help you plan and put on demonstrations.

Although 1951 range sales have not been totaled, East Ohio estimates that during 1950 and 1951, 100,000 ranges were sold in its territory. Since about 25,000 ranges were sold during the first six months of 1951, it seems that last year's fall promotion produced results comparable to those obtained from the 1950 campaign.

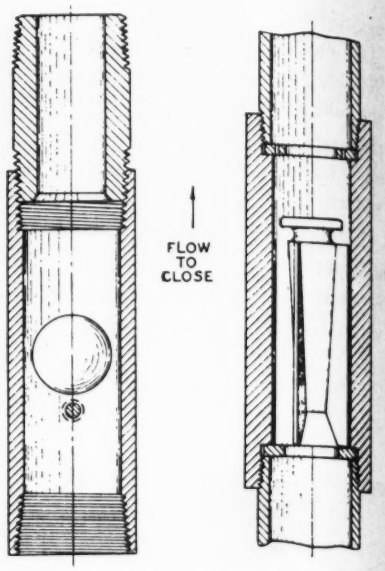
1950
and for streamlined cooking, naturally you prefer gas!
Smart young moderns are cooking with gas!
The East Ohio Gas Company
and for up-to-the minute cooking, naturally you prefer gas!
Smart young moderns are cooking with gas!
The East Ohio Gas Company
and for simple modern cooking, naturally you prefer gas!
Smart young moderns are cooking with gas!
The East Ohio Gas Company
and for easy dependable cooking, naturally you prefer gas!
Smart young moderns are cooking with gas!

Analogy between modern ranges and "economical luxury" was shown with tie-in technique in 1950 series.

1951
Smart young moderns were cooking that's thrifty
that's why your first choice is gas
THE EAST OHIO GAS COMPANY
Smart young moderns were cooking that's clean
that's why your first choice is gas
THE EAST OHIO GAS COMPANY
Smart young moderns were cooking that's sure
that's why your first choice is gas
THE EAST OHIO GAS COMPANY
FAST
GAS!
THE EAST OHIO GAS COMPANY

Approach in 1951 was altered to lay more stress on the range itself.

Excess Flow Valves Promote Safety in L. P. Gas Systems

By D. D. BUTTOLPH and HARRY R. ZEIGLER
Phillips Petroleum Co., Bartlesville, Okla.



Figs. 1 and 2. Ball check valve and slug check valve used in tank cars.

EXCESS flow valves promote safety in propane or butane storage and piping systems. These valves, sensitive to excessive flow, close when a hose or pipeline break vents to the atmosphere. Except for a 2-way acting excess flow valve used occasionally in very long pipelines, excess flow valves are made so they will not prevent reverse flow.

Pipeline breaks can be caused by mechanical strains due to changes in temperature or any other natural causes which directly or indirectly affect the pipes or tanks to which pipes are attached. Also some breaks have been caused by trucks or fire. There is always the possibility that tank cars or vehicles may be moved before the transfer hoses are disconnected.

Thousands of tank cars, storage tanks, tank trucks, and small containers are equipped with these safety devices. A smaller number is used in pipelines. Pipeline style excess flow valves are also used in L.P. gas truck piping, usually on the pump discharge line near where the delivery hose is attached. Greatest use is in liquid service but excess flow valves are also needed and used in vapor service. Direction of flow may be upward, downward, or horizontal.

Earliest excess flow valves were installed in tank cars. They were located just inside the manhole cover on liquid eduction lines which extend to the bottom of the tank and on vapor eduction lines which are above the liquid level. Excess flow valves in tank cars are of two types, ball checks and slug checks. Both depend on gravity to maintain the valve normally open until the flow reaches a certain rate. These valves have undergone very little change through the many years they have been in service. Typical valves are shown in *Figs. 1* and *2*.

Improvements required to make excess flow valves more useful included making them suitable for closing with any direction of flow, and a change in body style so that they could be inserted into tanks from outside.

Valves inserted from the outside readily protect tanks without manholes. Therefore, this phase of excess flow valve development has resulted in a considerable advantage in cost and weight of tanks. The weight advantage, amounting to several hundred pounds per tank, is especially important in the case of truck tanks. Cost advantage includes reduction of material, cutting, welding, and machining.

Various makes and models of excess flow valves tended to stick in the open position, one exception being the ball type valve. Since an excess flow valve, like a fire extinguisher, should be ready to operate perfectly when needed in spite of long periods of disuse, Phillips Petroleum Co. excess flow valves are constructed with loosely guided stems to make sure that nothing will prevent their operating properly. The discs are self-centering to compensate for the loose guides.

We have all learned, sometimes the

NON-CHATTER EXCESS FLOW VALVES

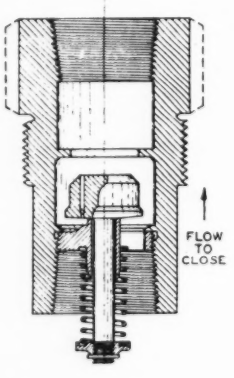


Fig. 3. Valve 1519-C for top outlets with or without eduction pipe.

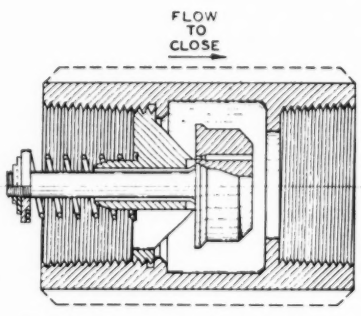


Fig. 4. Pipeline valve 1519A-2.

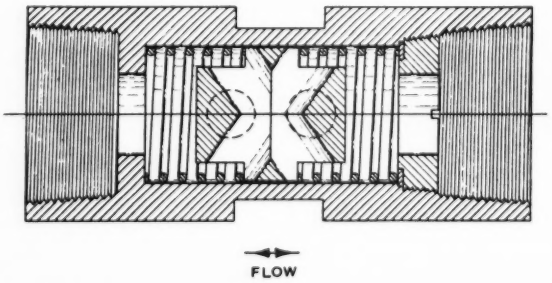
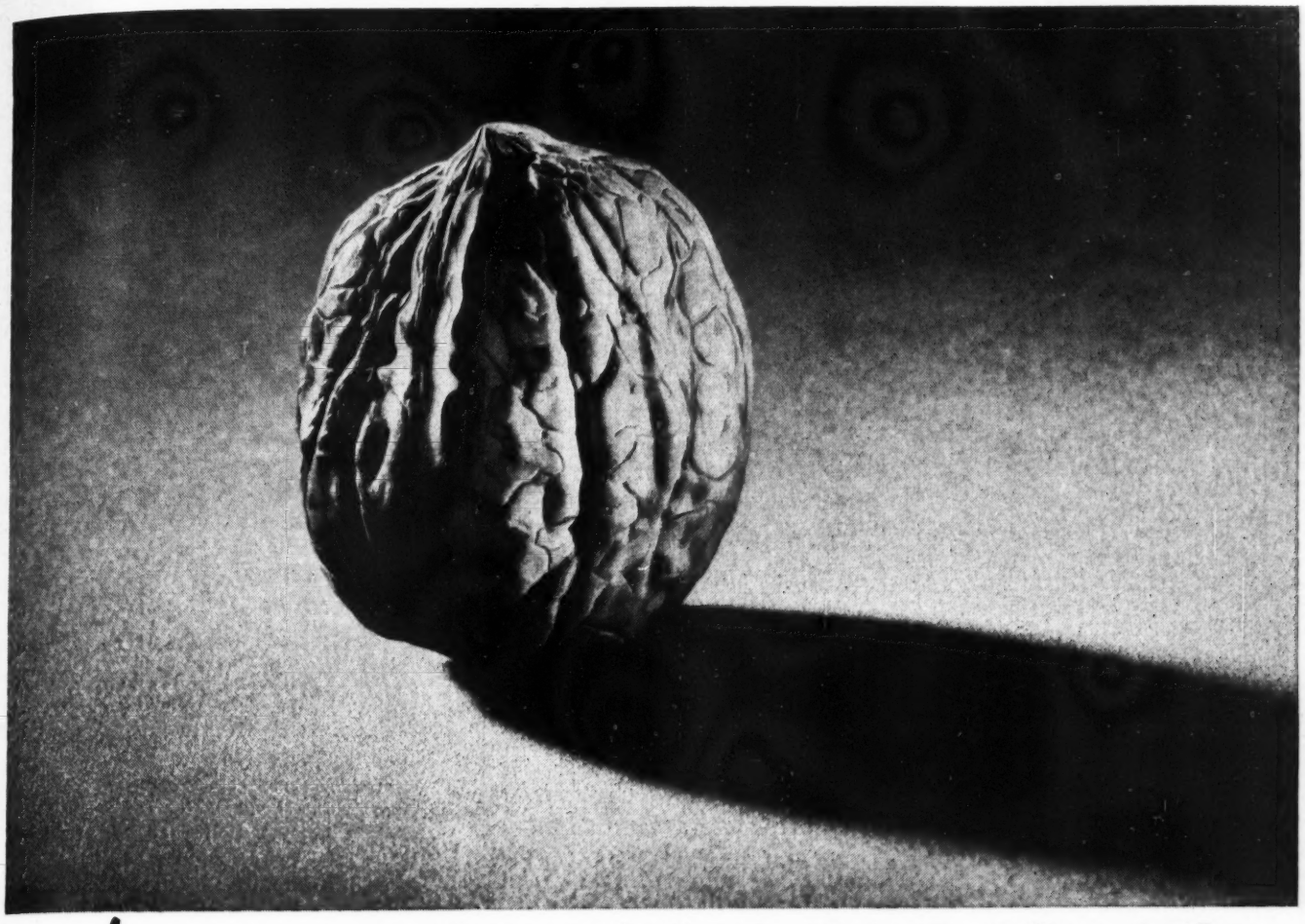
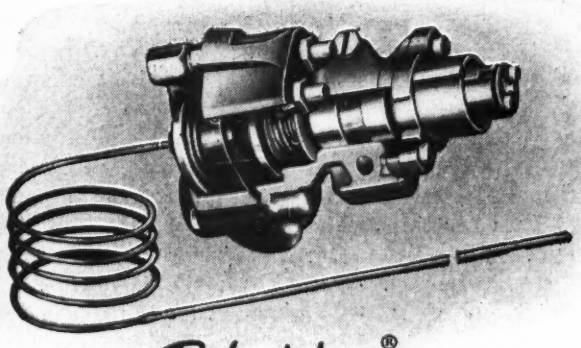


Fig. 5. Double acting excess flow valve.



IT'S THE KERNEL INSIDE THAT COUNTS



Robertshaw® MODEL BJ
Oven Heat Control

Low-torque gas cock and plug are made of a special alloy, exclusive with Robertshaw, that's unaffected by sulphurous gases, assuring a valve that's free turning under high or low temperatures.

In an oven heat control, too, the inside story is all-important.

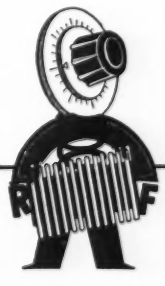
Robertshaw brings to oven heat controls the hard core of experience gleaned through 51 uninterrupted years of manufacture. Today's Model BJ Control is the result of lessons learned in producing 14 million units now in use with every type of gas under every operating condition. It is produced with specially designed automatic machinery plus matchless facilities for precision manufacture . . . and backed up by years of research and product development, much of it done in anticipation of the gas range industry's progressing needs.

Facts like these help explain why *Robertshaw* Model BJ Control is the overwhelming choice of the nation's leading gas appliance manufacturers.

In Home and Industry, ***EVERYTHING'S UNDER CONTROL***

Robertshaw-Fulton

CONTROLS COMPANY • GREENSBURG, PENNSYLVANIA



Robertshaw Thermostat Division, Youngwood, Pennsylvania • Grayson Controls Division, Lynwood, California • Fulton Sylphon Division, Knoxville, Tennessee • American Thermometer Division, St. Louis, Missouri • Bridgeport Thermostat Division, Bridgeport, Connecticut

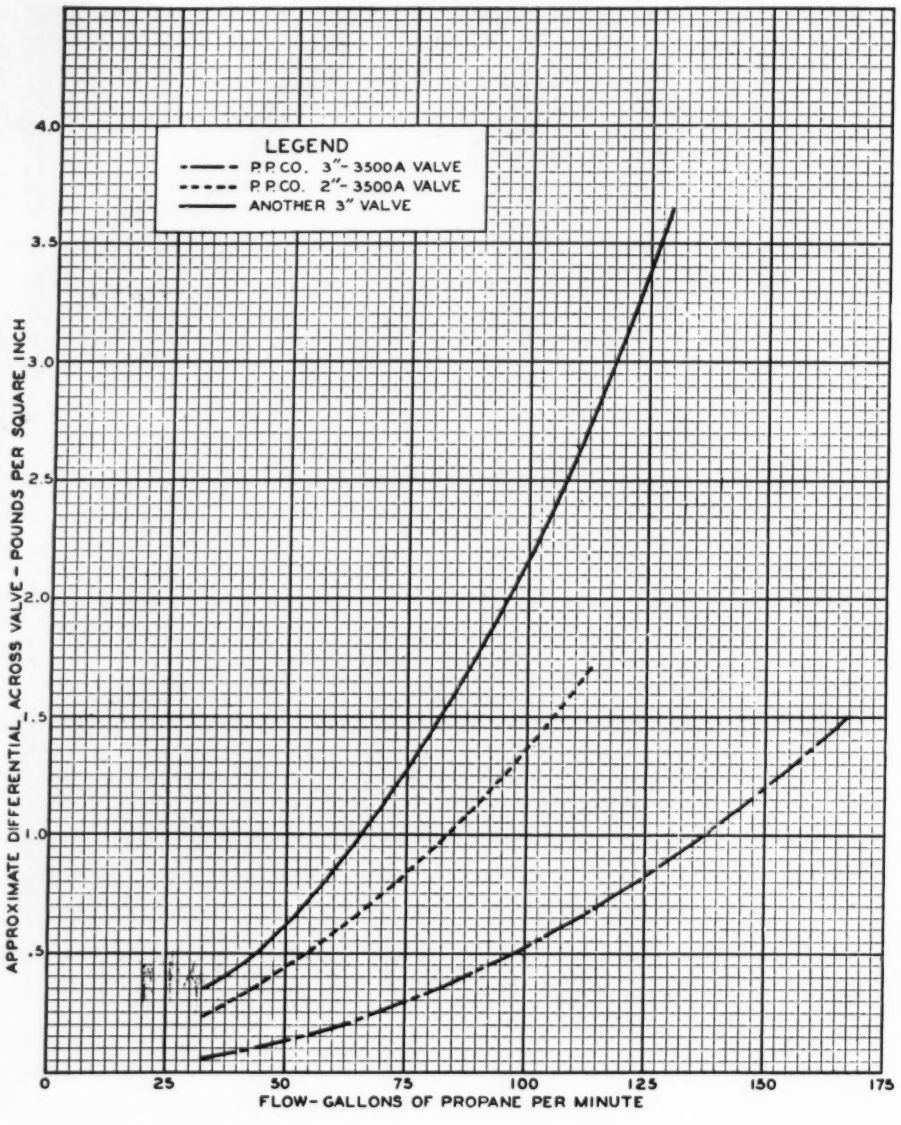


Fig. 6. Pressure drop versus throughput of three bottom outlet excess flow valves.

hard way, that to transfer volatile liquids (such as propane) satisfactorily, restrictions caused by valves, fittings, pipe, and so forth, must be kept to a minimum. At first thought, to obtain a low pressure drop, it seems practical to use an oversize excess flow valve and reduce to the desired pipe size at the outlet end of the valve, but there are several objections to this. The larger valve would cost more for material and manufacture, reducing fittings would complicate the piping, and if installed in a tank the tank opening would be larger.

A more important consideration is the attitude of the L.P. gas industry expressed in NFPA Pamphlet 58 (NBFU Pamphlet 58) paragraph B.6 (c) as follows: "The connections or line including valves, fittings, etc., being protected by an excess flow valve shall have a greater capacity than the rated flow of the excess flow valve."

The industry has interpreted this to mean that the thread size of the pipe connected to the valve outlet should not be smaller than the thread size of the valve itself. As it is economically undesirable to use oversize pipe, it is easy to see why excess flow valves should be constantly improved by increasing the flow capacity compared to the pressure drop.

There is a great difference in excess flow valves today as illustrated in the performance curves, *Fig. 6*, of a Phillips 3-in. No. 3500 A compared with another popular 3-in. valve. Perhaps this difference is emphasized by the performance curve of a 2-in. 3500 A valve on the same figure. These valves are Underwriters' approved.

A recent accomplishment in excess flow valve evolution is the non-chatter excess flow valve known as the Phillips 1519C. It was found that excess flow valves in pipelines and in eduction pipes of tanks would chatter under certain flow conditions due to liquid "hammer" effect. This chattering or hammering is undesirable and sometimes intolerable because of the noise, because of the damage often inflicted on the valve, and also because of the temporary disruption of operations. Another objection to a valve which is subject to chattering is that it will often fail to stay closed in an emergency, especially at low pressure.

It was necessary to carry on extensive flow tests in order to diagnose the cause of chattering and to devise a cure. As a result of much experimental work, a throttling type disc was developed which would close without chattering at unusually low upstream pressure; in most cases, the upstream or tank pressure could be as low as 10 psig.

The 1519C non-chatter valve illustrated in *Fig. 3* is manufactured for use in tanks for the protection of top outlets and it can also be used in end outlets and bottom outlets. The same principle is used in an excess flow valve of the pipeline style, known as 1519A2. (See *Fig. 4.*) In many localities all valves which are attached directly to liquefied petroleum gas storage tanks must be approved by Underwriters' Laboratories Inc. if such approved valves are obtainable. Phillips excess flow valves for storage tanks are Underwriters' Laboratories approved.

Several considerations are necessary when selecting excess flow valves. Flow capacity of the valve must be high enough to handle desired normal quantity of fluid but it should close automatically if flow exceeds this quantity materially. Usually the rating should exceed desired flow by 10 to 30%. Direction of flow (whether upward, downward, or horizontal) will influence capacity slightly. Vapor lines and liquid lines should be protected by these devices.

Development of excess flow valves has been due to their widespread use in the L.P. gas industry, but it is well to mention that they can be of great value to industries handling other combustible or lethal fluids. Since they are ordinarily rated in terms of propane flow, it is necessary to convert to flow of the proposed fluid. This can be done by taking into account the respective specific gravities of propane and the fluid for which the valves are to be used.

Valve materials must be compatible with fluids passing through them. For propane and butane any of the usual

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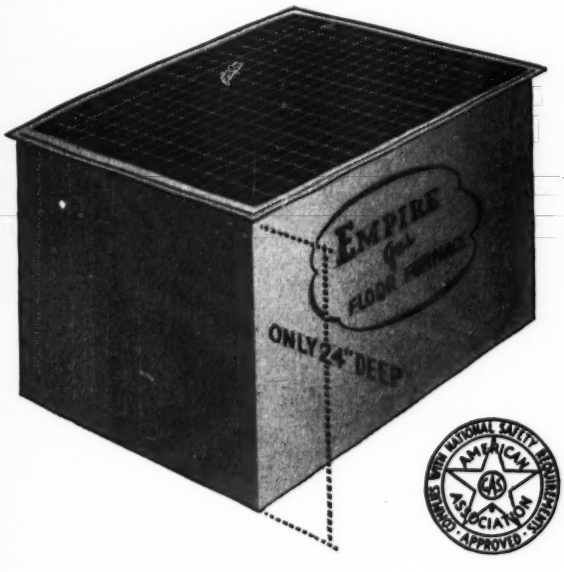

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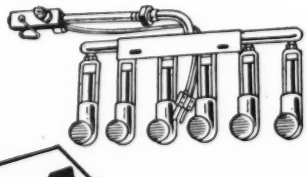

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WORLD'S LARGEST MANUFACTURER OF *Gas* FLOOR FURNACES

TABLE 1. Estimated Length of Liquid Propane Pipeline Protected by Excess Flow Valves Mounted on Horizontal Storage Tanks

Valve number	1519 C[1,2] 1519 A-2[2]		1519 C[1,2] 1519 A-2[2]		1519 A-2[2]		1511 A[1] 3500 A[1]		1511 A[1] 3500 A[1]	
Size	1"		1½"		2"		2"		3"	
Closing flow rating (gph)	1300		3500		6000[4]		6800[3]		10,000	
Closing differential (in. w.c.)	64		114		103		50		42	
Assumed storage pressure (psig)	10	20	10	20	10	20	10	20	10	20
Straight pipe protected (ft)[5]	90	275	80	320	120	435	205	455	710	1500

[1]Underwriters Laboratories Inc. listed for L. P. gas.
[2]Valve equipped with eduction pipe.
[3]1151 A & 3500 A can be furnished at lower ratings with correspondingly greater pipe length protection.
[4]Can be furnished at higher rating. (Not recommended.)
[5]Pipeline is same nominal size as the valve. Deduct from lengths shown to allow for valves and fittings in the line.

DESCRIPTION OF VALVES

1519 C	Has outside thread for insertion in tank outlet. Inside thread at one end for eduction pipe and at other end for pipeline attachment.
1519 A-2	Has inside thread both ends. For pipeline use.
1511 A	Short body valve for storage tank bottom outlets. Has outside thread for insertion in flange. Pipeline to be attached with companion flange.
3500 A	Similar to 1511 A except has longer body. Will not drain tank as low as the 1511 A but has less trouble from rust and mill scale.

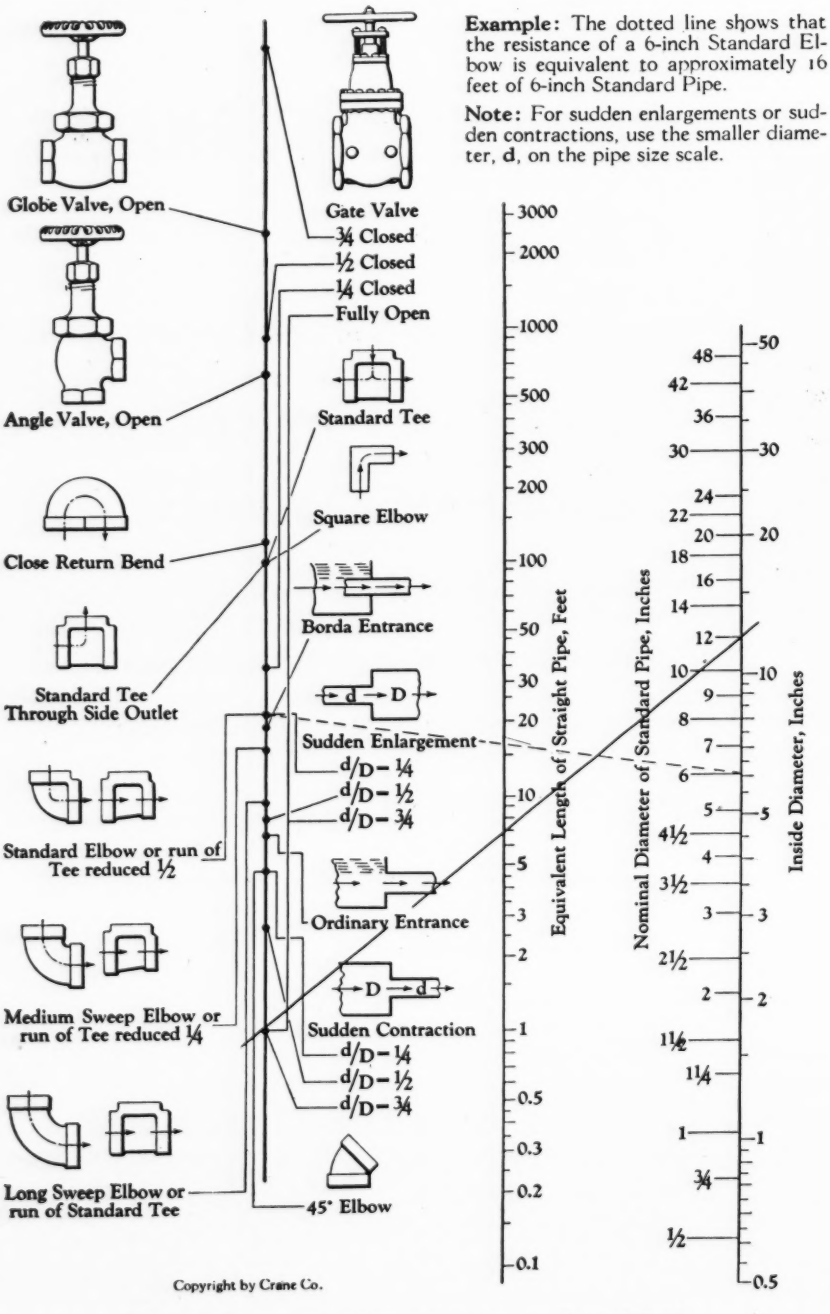


Fig. 7. Resistance of valves and fittings to flow of fluids.

metals are satisfactory and this is also true of dry chlorine. However, brass, bronze, and certain stainless steels are unsuited to wet chlorine. Carbon steel is suitable for dry ammonia while several grades of stainless steel can be used for wet ammonia. These are examples at random and the valve manufacturer can determine the best metals for other services.

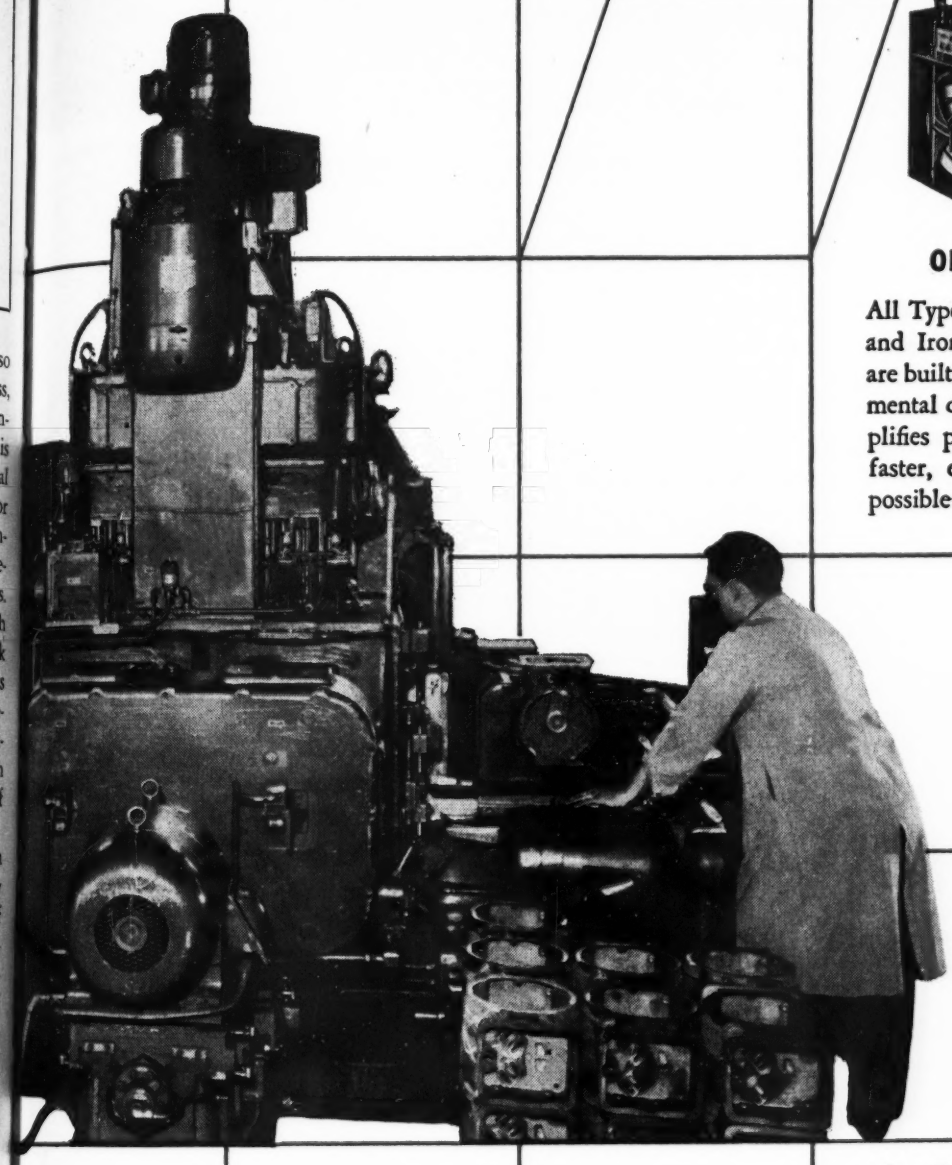
In the case of extensive pipelines such as exist in large industrial, utility, or bulk storage plants, several pipeline excess flow valves may be required. It is sometimes desirable to use double acting excess flow valves (see *Fig. 5*) in such pipelines to prevent back flow escape of liquid due to line breakage.

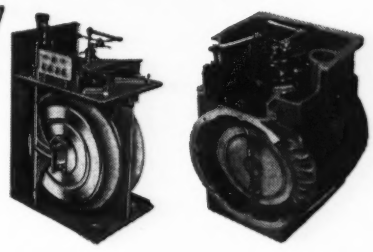
Users ask, "What protection will an excess flow valve give me?" The primary purpose is to protect against breakage of pipelines and hose connections. It is apparent that only breakage permitting unrestricted flow, i.e., a wide separation of the broken ends, will cause the valve to close, a matter entirely out of control of the designer or user of the valve. It is also apparent that if the break is too far away from the valve, the pipeline friction will retard the liquid flow below this unrestricted quantity, resulting in improper functioning of the excess flow valve.

Table 1 has been compiled to show the pipeline protection which can be expected when Phillips valves are installed in propane tanks and pipelines. The table is in terms of straight pipe, and *Fig. 7* can be used to make allowance for valves and fittings in the line.

Excess flow valves should be tested annually to make sure they will close properly. It is sometimes necessary to part the pipeline downstream from the valve being tested. If this is necessary, it should be done at the safest spot.

AT LOWEST UNIT COST PER YEAR

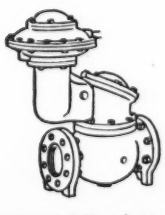




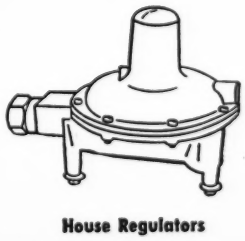
ONE STANDARD DESIGN

All Types and Sizes of Tinned Steelcase and Ironcase Displacement Gas Meters are built by *American* on the same fundamental design. This standardization simplifies parts stocking problems, assures faster, easier meter service and makes possible uniform shop practice.

Orifice Meters



Industrial Regulators



House Regulators

The efficiency and economy of *American* Meters is backed by more than 115 years of experience and by a constant purpose to provide the finest precision instruments known to gas measurement science.

American is and will continue to be the *first name* in metering dependability—always your *first choice for "Sustained Accuracy at Lower Cost."*

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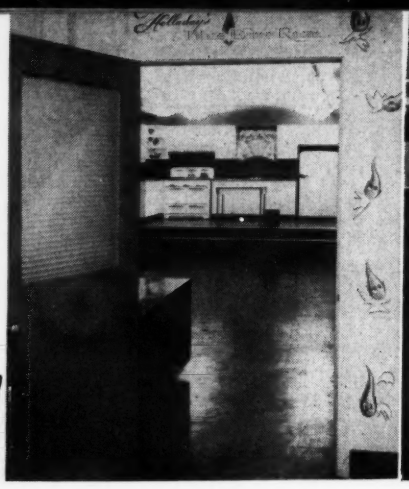
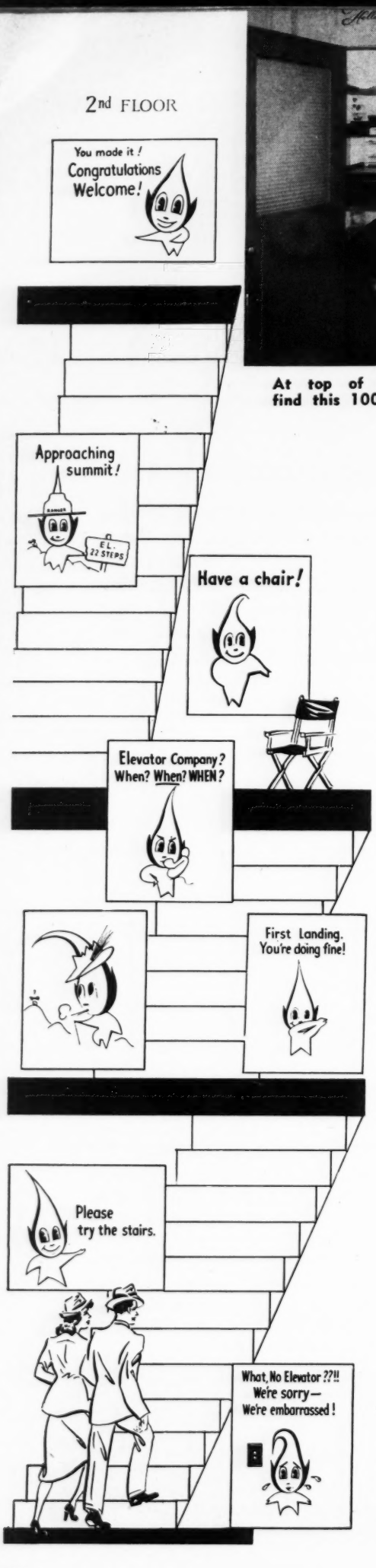
AMERICAN® METER COMPANY

INCORPORATED (ESTABLISHED 1836)



At top of stairs, customers find this 100-seat auditorium.

Blue Flame lamp post on the new sales and service floor points out the new location of all customer services.



It's a Tough Climb in Seattle

But the gas company uses a light touch to ease the strain for its customers

SEATTLE (Wash.) Gas Co. in mid-November 1951 faced an unusual problem. With the expiration of its downtown lease, it had explored several possibilities for the future, including a new building. When conditions ruled out the new building, Seattle Gas finally signed a three-year temporary lease relinquishing the main floor of its old building.

All went well for a time. The second floor was completely remodeled for a showroom and headquarters for all customer contact services—sales department, cashiers, and June Holladay's home service department. A new street-floor entrance led directly to a new elevator shaft up front. So far, so good.

Then things began to go wrong. The New York elevator company was suddenly strike-bound on Oct. 1. Soon it became apparent that there could be no elevator installation until sometime in 1952; and, as the strike continued with no progress toward settlement, nobody could say when "sometime" might be.

At this point the big move was only a few weeks away. Plans for a grand opening celebration were shelved. There was no way of getting around it . . . a good many customers would have to use the stairs.

President N. Henry Gellert was definitely concerned about customer service. He called in Charles M. Sturkey, vice president and general manager, and Norbert O. Fratt, vice president in charge of sales and merchandising, for some fast thinking on a plan to meet the emergency. For one thing a temporary cashier's cage could be (and was) built on the street level near the still vacant elevator shaft. But for other services, there was that unavoidable flight of stairs.

Mr. Sturkey and Mr. Fratt thought that something might be done at least to ease the strain of the climb. Why not some mountain-climbing cartoons along the stairway with appropriate, apologetic, light-vein captions?

The company's advertising agency, Honig-Cooper Co. was asked to work out something. And the result, which you see on this page, was a series of Blue Flame characters along the stairway walls. The series begins with: "What, no elevator??!! We're sorry; we're embarrassed. Please try the stairs." From that point, the series continues with mountain goats, alpine hats, mountain rangers, a "rest stop" complete with blue chair, and the final, "You made it—Congratulations—Welcome!"

The typical comment from customers has been: "It helps a lot, really!"

When the customers reach the all-new second floor, they are dazzled by a brilliant display floor with every facility for customer service. Quite frequently they detect a delightful aroma direct from the gas ovens in June Holladay's "Blue Flame Room"; in fact, when the accordion-fold wall panels are open, June's stage-level model gas kitchen is plainly visible to all on the sales floor.

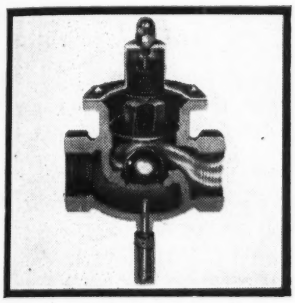
All in all, there's a fair reward for those who make the stairway climb. But even though the Blue Flame elves on the stairway have been doing a good job in the emergency, Seattle Gas is none the less looking forward to the day when these elves can be released to their regular job as gas salesmen.

POLY-TROL*-
SAFETY SHUT-OFF VALVE

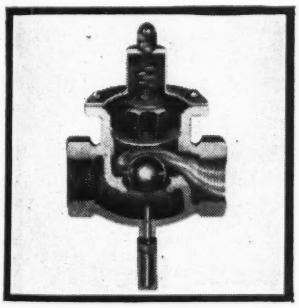
Utilities SH

"Gas is Safe!"

BECAUSE THEY GUARD THEIR PUBLIC WITH ANOTHER H-B FIRST IN "SAFETY FIRST"



Pressure Shut-Off—Pressure forces diaphragm up, compressing pressure release spring, opening ball retainer fingers. Ball forms perfect seal in neoprene ring.



Temperature Shut-Off—Fusible tip telescopes into hollow adjusting screw at 200°, relieving pressure release spring. Fingers open and ball drops into neoprene seal.

You *can INCREASE* public acceptance of gas! How? This *new*, sure safety device prevents the disasters that are shocking the country. The POLY-TROL Safety Shut-off Valve—another safety "first" by Handley-Brown—protects both public and utilities against

- Explosions due to *excessive pressure*
- Explosions due to *excessive temperature*

AND this dual-safeguard is completely automatic!

HOW DOES POLY-TROL WORK?

This double-safety valve is installed upstream from your meters in schools, theatres, countless other public buildings where hundreds—thousands—gather. It's two-bit life insurance for your residential customers, too. The principle is the same. Over-pressure drops the ball instantly, shuts off service completely and AUTOMATICALLY! Gas cannot blow through and cause a disaster. In case of fire, exposure to 200° F. ambient temperature for approximately one minute or less cuts off service completely and AUTOMATICALLY, ahead of the meter. Your meter can melt or fall apart! NO GAS CAN ESCAPE!

WHAT DOES POLY-TROL PROTECTION COST?

Peanuts! The prevention of just one disaster—such as a school explosion—pays for installation throughout your system. And POLY-TROL installations in your public buildings alone provide excellent opportunities for strengthening the good-will of potential and current consumers.

OTHER POLY-TROL FEATURES:

• Eliminates need for curb cocks • Can be used as a shut-off valve • Reduces service calls • Cuts fire runs by utility trucks and men • Installs easily in minutes—no special tools or skill required • Sizes available, 1″, 1½″, 2″ • Many industrial applications—Protects against over-pressure hazards—Reduces down time and accidents.

INTERESTED? Then write for folder with full details. Say the word and we'll arrange a convincing demonstration by your Handley-Brown representative.

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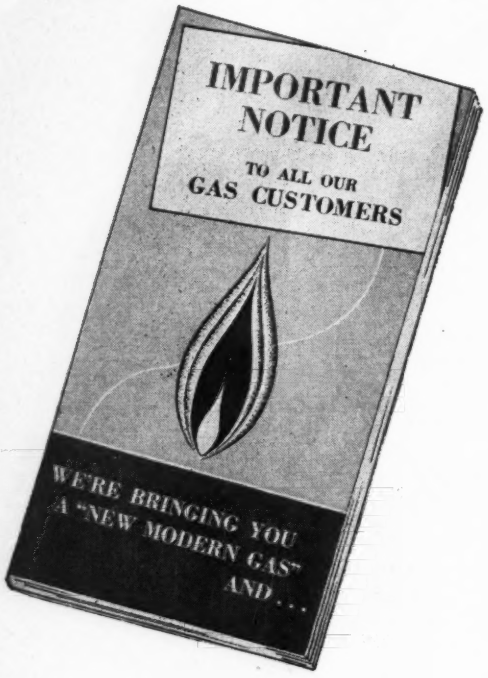


"New Modern Gas" was the name given to its 1004-Btu oil gas by New Bedford in this and other mailings, to acquaint its customers with the operating characteristics and to prepare them for the changeover job.

A BRIEF CASE HISTORY

New Bedford "Plays It Safe" In Converting to Oil Gas

By A. MALCOLM MAGER
New Bedford (Mass.) Gas & Edison Light Co.

A change from one type of gas to another is a major operation for any gas company, regardless of size. Every utility is set up to handle the normal operating and service problems that come along, and whether it has 100,000 or 5000 meters, a conversion will completely upset the normal routine and the problems encountered will be parallel.

In the case of New Bedford Gas & Edison Light Co., we have approximately 40,000 meters and an estimated 120,000 appliances. Included in these are some 1000 central heating installations and, at the time conversion started, some 6000 space heating installations, the large majority being console-type room heaters of 40,000 or 60,000 Btu input.

There were many factors to be considered in addition to the actual physical conversion of the appliances. Public relations and safety were two of the big items, and my purpose here is to give you an idea of some of the things we did to help us come through with what we feel is a good safety record.

We had a somewhat different problem than had been faced before. We were planning to distribute an oil gas of 1004 Btu with a specific gravity of .87. Oil gas is not new, but there were not many companies who had used it. Cambridge was the guinea pig in that field, having converted in 1947. Lynn came along in 1950, and Newport (R. I.) converted about the same time that we did. There are a few other companies who have gone to oil gas, but the overall experience is small.

Appliances operating on oil gas must be adjusted exactly right. Slipshod methods will not suffice. Once the appliance is adjusted correctly, however, it will operate indefinitely without further service difficulties. We were installing an oil scrubber that would scrub out a large percentage of the light oils. This would keep the illuminants down and, because of this, we felt we were a jump ahead of some of the companies who had not used a scrubber.

We were and are still hoping that natural gas will get down New Bedford way by next summer. Since we did not want to go through two conversions, it was decided that a conversion to oil gas would have to be made that would also give good operation when natural gas came along. Since the flashback and yellow tip limits of oil gas are both inside the corresponding limits for natural gas, it was apparent that the problem would not be one of combustion but rather one of input.

The difference in Btu content and specific gravity between oil gas and natural gas means that with the same orifice and the same pressure, the Btu input on an appliance would be increased slightly with natural gas. Since these two statements were theoretical, we decided that it was necessary to make physical tests to determine just how they would affect our conversion and how we could make use of the information in making the oil gas conversion work for natural gas as well.

Since our operation made 1000-Btu oil gas available some weeks prior to conversion, a laboratory of sorts was set up and high-Btu oil gas, and natural gas which we obtained in cylinders, were piped in, in addition to the gas we were using at that time. We then set up ranges, refrigerators, water heaters, and heating appliances, and proceeded with tests.

It was found that a burner with a good adjustment at rating on oil gas burned with a good but softer flame on natural gas, but the input was somewhat increased due to difference in gravity. As a result, it was decided to make the conversion to oil gas by slightly undergassing all domestic appliances and adjusting them with a fairly sharp flame to compensate for an increase in input with the introduction of natural gas.

Tests proved that it was unnecessary to drill range and water heater burners and, consequently, instructions were issued that domestic appliances would be a little undergassed, and no ports would be drilled unless it was absolutely necessary. We naturally received repercussions from the industry on this, but the fact remains that we did it and are getting successful operation on oil gas.

After considerable discussion, we decided to divide our system into districts of approximately 1500 meters each on the basis that 1500 meters could be converted in two days. Two-day sections were set up principally to keep customer inconvenience at the lowest possible level; however, a two-day section also had a great deal to do with safe operation of appliances during the period that the customer was using the new gas without proper adjustment.

With a two-day section, it was possible in most cases to convert all gas refrigerators the first day. Since the refrigerator was the most critical appliance, particular care was used in planning and handling this part of the conversion. Because we felt assured that we would reach them all the first day, our refrigerator customers were requested to turn their refriger-

Adapted from an article presented at the 8th annual safety conference of the New England Gas Assn. on Nov. 8 in Boston.

ators to defrost until the conversion man arrived. It did take quite a lot of pressure to get the conversion company to maintain a large enough crew to take care of all refrigerators the first day but, after the first few sections, a system was devised that worked satisfactorily.

Customers were advised that oven and broiler burners should not be used under any circumstances, but that top burners could be used at about one-third of the normal setting. Turning off water heaters and all other equipment was listed as a must. As a final word, the customer was cautioned to be sure that adequate ventilation was maintained, particularly in the kitchen.

Publicity was worked out in great detail, starting with an article in the paper showing the entire city broken into numbered districts. Envelope stuffers were used to inform the customer what we were doing, and two days before each district was turned in, every customer received in the mail a pamphlet outlining the instructions for operating appliances previously mentioned.

The night before each district was turned in, a large detail map of that district was published, and that, along with spot radio broadcasts, kept our customers informed. Largely because of the ample publicity and explicit instructions, we went through the entire conversion without an accident due to customers not handling the new gas properly before their appliances were converted.

Our distribution department had one of the biggest jobs to handle, and because of the excellent planning and careful work, there were no accidents due to purging and turning in the different districts. Purging was usually started around 3 a.m. and, in nearly all cases, was completed in time for the crews to start work. Purging was done by pressure as much as possible and the old gas was moved into adjoining sections by the new gas. Ends had to be purged to the atmosphere, but this type of purging was kept to a minimum.

Maximum manpower on the job was around 280, with an average during the domestic conversion of about 250. The men worked a minimum of 10 hours per day, usually six days a week, although on several occasions it was necessary to work Sunday too. Approximately 95 cars were in use as an average from the start of the conversion to date. There are still 18 men working. There were 36 personal injury reports. Of these, only five involved lost time, one of them for two men, with a total lost time of 16 days. There were no explosions. Two customers received slight burns from flashbacks resulting from improper lighting procedure on their part.

An analysis of these accidents is rather interesting.

Eleven of them (31%) were directly due to the electric drill, nine of which consisted of metal burrs in the eye, with one in the finger; and one was a punctured finger. None resulted in lost time, but all required medical attention. Eight accidents were minor cuts for miscellaneous reasons, tools slipping, etc.; two were minor bruises received in car accidents and three were miscellaneous accidents.

There were three strains, two of them resulting in lost time. In one case, involving three days lost time, a man strained his leg when he slipped while drilling a burner. Another man strained his shoulder when a wrench slipped; he lost one day.

There were two falls on stairs, one of which resulted in three days lost time because of a strained back.

The welder in the shop persisted in doing some of his work without his goggles and finally wound up with burned eyes and three days lost time.

There were six burns, four of them from flashbacks, one of which resulted in three days lost time for two men. This was the only accident that reached the newspapers and received any publicity. The accident was not nearly as bad as the papers indicated and was the result, as usual, of carelessness.

A crew was working on a big boiler in one of the local high schools. The boiler is a standby and had not been used for more than 10 years. The controls were rusty, the gas cocks were leaking, and it was in pretty poor condition. The burners had been removed and part of the crew was drilling them. Two of the men, who were working on the safety pilot, lit it without checking to see whether all the burner cocks were closed. Several of them were open. The safety pilot was not safe, and gas was discharged directly from the orifice into the burner chamber. Because of the noise from the electric drills no one heard the gas and it finally built up and blew in the boiler. Two men received facial burns and required hospitalization.

All in all, however, we feel that the conversion crew turned in a splendid safety record for the job.

There are one or two points that I would like to bring out concerning the conversion of the appliances themselves. The gas refrigerator was considered the most critical appliance as far as adjustment and safety were concerned and a great deal of time was spent on tests previous to the conversion. The manufacturer told us that one conversion for both oil gas and natural gas could not be made, but in New Bedford we have not hesitated to work things out for ourselves if we disagreed with a manufacturer.

Several models of refrigerators from the ED-1934 to the current models were set up and tested for input and CO from the flue. The conclusion reached was that refrigerators could be safely undergassed 10% with oil gas and, when natural gas was turned in, would be within the safe limits of overgassing. An orifice size and maximum burner pressure was selected that would allow the pressure to be dropped, .5 to .6 in. if necessary, to bring the refrigerators to normal rating with natural gas.

All water-cooled refrigerators were undergassed 15% because of the small generator flue. All air-cooled models through the H models had a flue cleaning immediately after conversion. When natural gas comes, we plan to immediately reduce burner pressures on all models through the H series, to bring them back to rating. New charts will be made up and the J models to date will be corrected for input on routine service calls. Actually, there was less trouble from refrigerators during and since the conversion than from any other appliances.

I think one of the big factors in a successful and safe conversion is the use of company inspectors. Four inspectors were put into each district the day following conversion. With four men, it was possible to get about 5% inspection. This paid dividends, but if manpower had been available, this number would have been doubled or even tripled. This inspection served several purposes. It picked up incorrect conversions and, because some things were found early in the conversion, it was possible to forestall later troubles. It tended to keep the conversion crews on their toes because they knew our inspectors were following them.

Errors that were found were not corrected unless the condition was unsafe. A record was made of what was wrong and this was turned back to the conversion company. The company then gave it back to the crew foreman who worked that area, and he carried on from there. It also helped to maintain public relations. Ranges, refrigerators, and space heaters were spot checked. A 100% inspection of unit heaters, floor furnaces and central heating was attempted, but realized in central heating only.

There is probably no such thing as a perfect conversion, but thorough planning of all phases of the work will result in the safest possible changeover. Under the best conditions, the service department will spend some weeks getting back to normal. Even a successful conversion means troubles, and the primary aim should be to keep them at a minimum.

NEWS

Financial

Strong Protests Greet TGT Rate Jump Approval

Nationwide repercussions were predicted as a result of FPC's recent approval for filing of an $11.4 million annual rate increase requested by Tennessee Gas Transmission Co., Houston. Originally, the company asked for an upward revision of $18 million a year. Scope of the case is indicated by the fact that two of Tennessee's wholesale customers —Columbia Gas System and Consolidated Natural Gas Co.—serve 2½ million direct and indirect retail customers who will bear the brunt of the increase.

The new rates were to be effective as of Dec. 17, 1951, upon the filing with FPC of a $100,000 bond conditioned upon the faithful performance of obligations specified in the order. The schedules will remain in effect until accepted or amended by FPC order.

FPC has a backlog of rate applications from other gas transmission companies aggregating more than $80 million. During the past month, the commission has reported the following actions:

Oral argument has been set for Feb. 28 on the complaint of the city of Hastings, Neb. against Kansas-Nebraska Natural Gas Co. Inc., Phillipsburg, Kan. The city alleges that a restriction in the rate schedule is unlawful in that it provides that the schedule shall not apply to the volume of gas which may be used by the city in its electric generating stations. Kansas-Nebraska has filed a motion to dismiss the complaint, contending the FPC has no jurisdiction.

On Jan. 16 a hearing got under way on the rate increase proposals by Atlantic Seaboard Corp. and Virginia Gas Transmission Corp., both of Charleston. The argument centered around exceptions to a presiding examiner's intermediate decision requiring the two companies to file new rate schedules. The proposed schedules have been under suspension since April 1950 but went into effect under bond last Sept. 1.

An FPC order has been issued permitting West Texas Gas Co., Lubbock, to file a substitute rate schedule, increasing its wholesale price by $68,000 a year instead of $102,700 previously proposed. The hike, effective Jan. 1, applies to sales to Southern Union Gas Co., Dallas.

In a similar case, Kentucky West Virginia Gas Co., Pittsburgh, was allowed to file a substitute schedule providing for a $455,890 wholesale increase in lieu of a previously requested $1,139,000 per year. Beginning Jan. 1, Louisville (Ky.) Gas & Electric Co. and Pittsburgh & West Virginia Gas Co. were affected by the new schedule.

Northern Natural Gas Co., Omaha, applied to the commission for higher rates to some 27 utility customers. The proposed $10.6 million annual increase is in addition to two other hikes applied for in April 1950 and October 1950, totaling $9.3 million, now pending before FPC. The two prior increases were suspended and are now in effect under bond. Part of the latest increase was to become effective Jan. 27, the remainder Feb. 27.

In the meantime, the state of Minnesota urged the FPC to suspend Northern Natural's latest request and to hold hearings on its "reasonableness." The state is a direct customer of many utilities which buy from Northern Natural and furnish gas to state institutions. No funds are available to pay gas price increases at the institutions, the attorney general stated.

Two other proposed increases have been suspended and one was rejected by the commission. South Jersey Gas Co., Atlantic City, wanted to charge Jersey Central Power & Light Co., Asbury Park, and Cumberland County Gas Co., Millville, N. J., an additional $97,000 a year for wholesale service, but FPC suspended the hike and deferred its use until May 20. An 89% rise in wholesale service to Southern Natural Gas Co., amounting to an annual $1.3 million, was asked by United Gas Pipe Line Co. to offset the Texas gathering tax. This proposal was suspended and its use deferred until May 26.

The schedule which FPC rejected was submitted by Alabama-Tennessee Natural Gas Co., Florence, Ala. Hearing was set to begin Jan. 14 to determine just and reasonable rates for the company. The commission also set a further hearing on Natural Gas Pipeline Co. of America's (Chicago) $2.4 million annual increase. The hike, which amounts to 10% based on anticipated 1952 sales, is in effect under bond.

In Oklahoma, an annual increase of $3,224,662 was granted Oklahoma Natural Gas Co., Tulsa, by the state corporation commission. The raise is based on a commission allowance of 6% on investment and will boost the average gas bill by about 13%. When new schedules are worked out, the higher rates will go into effect in 125 cities.

Washington (D. C.) Gas Light Co. last month requested that its allowable rate of return be boosted from 6 to 7%. The proposed increase would yield about $2,344,000 a year.

Laclede Takes Stock Fight With Supplier to Court

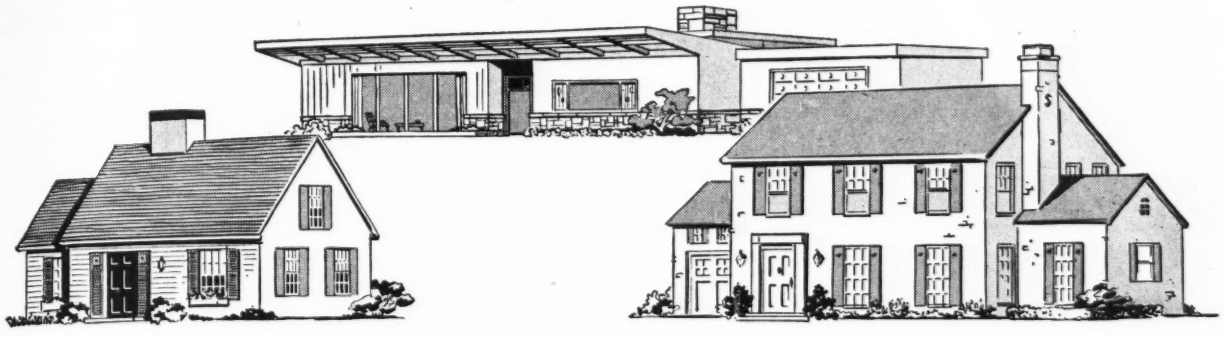
Filing of a suit in circuit court to bar Mississippi River Fuel Corp. as one of its stockholders last month climaxed Laclede Gas Co.'s battle with its supplier. The action presumably was timed to precede Laclede's Jan. 24 annual meeting, at which Mississippi River Fuel intended to elect a member of the board. Both firms are located in St. Louis.

The suit asked for a declaratory judgment from the court holding that Mississippi River is not lawfully a stockholder of Laclede or entitled to exercise any of the rights or privileges of a stockholder. In addition, the court was asked to hold that Laclede is not required under law to permit Mississippi River or anyone else acting in its behalf or at its instigation to inspect the list of stockholders, corporate minute books, or other records of Laclede, or to give Mississippi River Fuel any information about Laclede's business or affairs.

At the same time, the city of St. Louis announced that it was joining Laclede in an attempt to force Mississippi River Fuel to supply more natural gas to consumers in the city.

Mississippi River, meanwhile, announced that it has three alternatives under consideration: (1) Acquisition of outright control by making a public offer to all Laclede stockholders. (2) Pursuit of the present course of holding a large minority interest with the intention of having representation on Laclede's board. (3) Eventual sale of its Laclede stock if a sufficiently substantial profit should become available.

NIGHT VIEW of Southern Union Gas Co.'s newest office, opened recently at Albuquerque, N. M., shows front entrance and lobby. The entire second floor of the $350,000 building is occupied by the "Hospitality Room" which is available to civic groups. Albuquerque is one of 54 communities served by Southern Union.



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It will pay you to standardize on Coleman quality for every home use. For Coleman makes heating units for every heating need, for every size and type home. And when you tell a customer your heating appliances are Coleman guaranteed—you'll know right away that you've said the right thing! Coleman "know-how" and consumer acceptance of the Coleman name as a standard of quality will help you serve more customers better. Write for further information.

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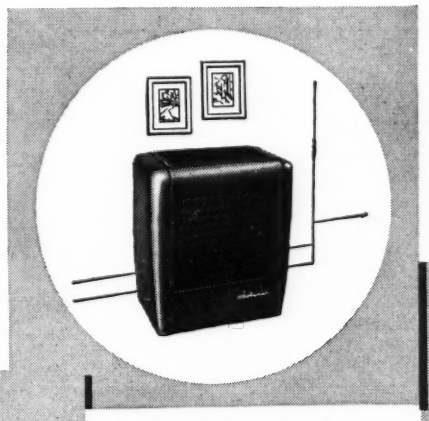
The very tops in beauty, tops in performance. They have the latest heat engineering features that provide low-cost automatic comfort for homes everywhere. Customers prize these heaters that pay for themselves in fuel savings.



Coleman Dual Wall Floor Furnaces

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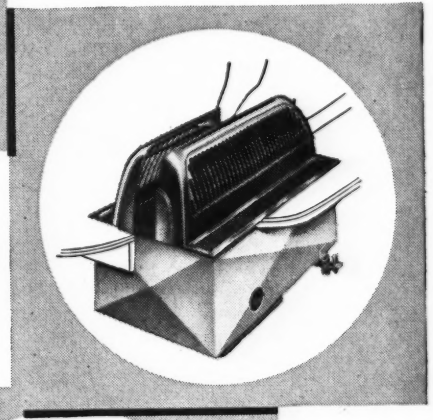

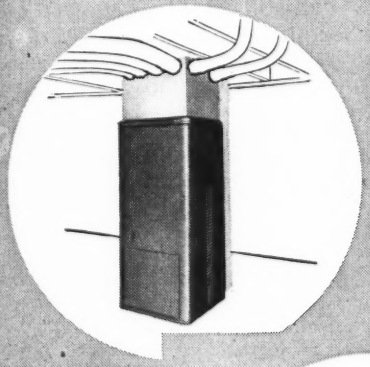

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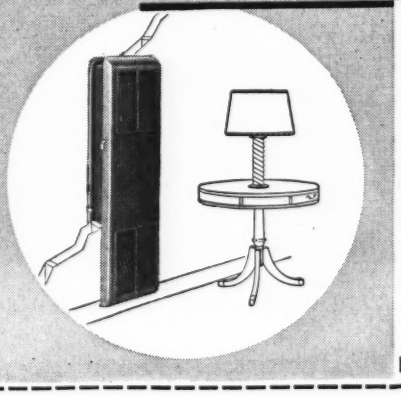
They fit right in the wall, extend out only 3⅜". Use no room space. Single and Dual Wall models. Ideal for slab-floor homes, motel courts. The Coleman Company, Inc., Wichita 1, Kansas.



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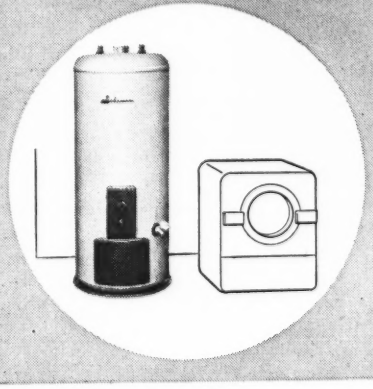

Coleman Jet Recovery Water Heaters

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Texas Defends Gathering Tax in Court Test

In a formal reply to 10 cases pending in Austin, Texas district courts, seeking to recover taxes paid under protest, the state last month officially denied charges that its new gas gathering tax is unconstitutional and unworkable.

The statement was considered a move to gain time for preparing a fuller defense. Seven interstate pipeline companies filed suits to test the gathering tax which went into effect Sept. 1, and similar suits have been filed by Lone Star Gas Co., R. Olsen Oil Co., Taylor Refining Co., and Shamrock Oil & Gas Corp.

About 90 taxpayers paid the tax under protest and, in order to keep the state from spending the money, they must file suits. It is expected that after the first case is tried, attorneys will consolidate the cases for an appeal to higher courts.

Gov. Allan Shivers has warned that a special session of the legislature will be ordered if the tax is invalidated and the state is forced into a deficit.

Court Awards Laclede Tax Credit on Rate Refunds

Laclede Gas Co., St. Louis, is entitled to a credit of $96,530 in gross receipts taxes paid to the city on a special fund of $1,930,624 set aside by Laclede for refund to its customers under a 1948 rate reduction order, a circuit court has ruled.

The special fund represents savings to the company growing out of lower rates it paid to Mississippi River Fuel Corp. and Interstate Natural Gas Co., its suppliers, while natural gas rates were under study by the FPC. Laclede said it would ask the Missouri Public Service Commission for an order to refund the money if the city does not appeal the circuit court ruling.

The state commission previously ordered Laclede to pass on to its customers any savings resulting from proceedings before the FPC. The utility lowered its rates effective Nov. 1, 1948, but actual refund to the customers has been held up because of litigation over the city taxes.

Gas Heats Branding Irons at Fort Worth Hotel

Natural gas is playing a unique role at the swank Western Hills hotel in Fort Worth. It's being used to keep branding irons white hot.

Designers of the Branding Room wanted atmosphere, an open fire, and hot branding irons for the steak selection center where guests choose their steaks and brand them R for rare, MR for medium rare, M for medium, etc. How to keep the branding irons hot without having a smoky fire and inconvenience was the problem.

Lone Star Gas Co.'s Fort Worth division commercial salesman, Donald Buckingham, came up with the idea of covering a gas burner with coal nuggets. A concealed gas line in the branding stand fuels two small coffee urn burners. Over the burners are spread small nut-like nuggets of fire clay which, when hot, resemble coals.

The coals glow, the branding irons stay hot, and the guests are delighted.

FPC Conditionally Okays United-Wunderlich Deal

Certain United Gas Pipe Line Co. (Shreveport) properties in Texas and Oklahoma, including 678 miles of pipeline, will be sold to Martin Wunderlich of Omaha and Lee Aikin of Corpus Christi with FPC approval if two conditions imposed by the commission are met. (See *GAS*, Jan., p. 104.)

Wunderlich and Aikin must file (within 30 days of the FPC approval) an application for FPC permission to transfer the facilities to Lone Star Gas Co. Within 90 days, Lone Star must file for authority to acquire and operate the facilities.

Wunderlich and Aikin have formed the North Texas Gas Co. Ltd. to operate United's Wichita Falls district, and Lone Star expects to be able to supply the new firm with sufficient gas for operation without significant curtailment.

Gas Companies' Capital Financing Hits New High

Last year total volume of long-term capital financing by straight operating gas utilities and pipelines reached a new annual peak of $808 million, the American Gas Assn. has reported. This represents an increase of 6.9% over 1950's $756 million. Financing activities of combination companies are not included in the figures.

Of the total, $742 million was raised by natural gas companies, 4.7% more than the previous year. Long-term financing by combination companies aggregated $669 million, a decline of 17.5%. In addition, $242 million of new financing was obtained by gas utility holding companies, compared with $260 million in 1950.

Despite the larger total volume of financing, common stock issues sold in 1951 amounted to $54 million, down 21%, while preferred stock issues totaled $75 million, up 9%.

Con Ed Saves $6 Million

Operating expenses for 1951 would have been $6 million higher without natural gas, Harland C. Forbes, executive vice president of Consolidated Edison Co., told the New York Society of Security Analysts last month.

Currently, he pointed out, the annual saving should be about $11 million based on present oil prices. This saving does not take into consideration the higher rates requested by Transcontinental Gas Pipe Line Corp., ConEd's supplier, now pending before the FPC.

The utility's gas business has come into its own, Mr. Forbes said, after averaging a return of less than 2% over the past 10 years.

Southern Natural's Gas Costs Rise Steeply

For the 12 months ended Nov. 30, 1951, Southern Natural Gas Co.'s (Birmingham) cost of gas was 6.53 cents per Mcf, and the price paid to various suppliers ranged from 4.62 to 11.9 cents.

"We expect our average cost of gas to increase to 8 cents in 1952, to 10½ cents in 1953, and to 11 cents in 1954," C. T. Chenery, chairman of the board, stated at a meeting of the New York Society of Security Analysts last month. "Our average sales price is 18¾ cents per Mcf, which leaves 12¼ cents per Mcf for transporting the gas. Of this, about 4 cents is paid in taxes, leaving 8¼ cents per Mcf to cover all operations, including return on investment."

It is therefore apparent that any increase in the price of gas in the field has to be passed along to the consumer, Mr. Chenery said, and that in the future such field price will exceed the cost of transporting the gas to market.

Washington Relieved of Interest on Rate Rebate

Washington (D. C.) Gas Light Co. does not have to pay about $65,000 in interest on a court-ordered $1,250,000 rate rebate, the U. S. Court of Appeals ruled recently. The ruling also set up a list of criteria to govern a "special master" in dividing $55,000 in attorney fees and an estimated $12,715 more for legal expenses.

The case was an outgrowth of a 6.14% rate hike granted by the utilities commission in late 1949 and later set aside by the District Court. The late District Court Judge T. Alan Goldsborough ordered the utility to pay consumers 5% interest on the rebate, but the appeals court decision stated that "there is no statutory authorization of interest in the circumstances here presented."

Plan Mississippi Line Sale

Mississippi Valley Gas Co., Jackson, has asked for FPC permission to acquire and operate certain pipeline facilities of Mississippi Power & Light Co., also of Jackson.

The properties in question are being used by Mississippi Power & Light for transmission and sale of gas in the western part of the state. Mississippi Valley is a new firm, organized primarily to acquire and operate these facilities as well as existing systems in Humphreys, Leake, Sharkey and Tate counties which MP&L now leases and operates.

Basic purchase price for all the properties to be acquired is set at $11,151,128, subject to closing adjustments.

Financial Newsnotes

The merger of Colorado Interstate Gas Co. with Canadian River Gas Co., both of Colorado Springs, has been approved by the SEC and became effective on Jan. 1. Last summer FPC authorized Colorado Interstate to acquire the Texas Panhandle field producing properties of Canadian River, but SEC's approval was required for a stock

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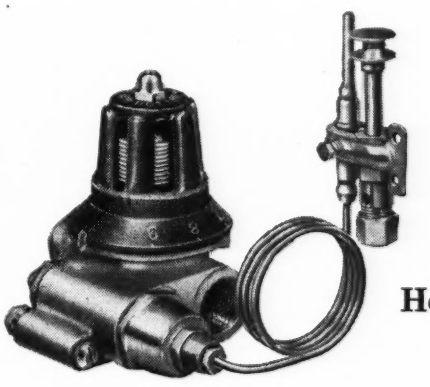

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Console Heaters
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Honeywell's New Modulating Thermostatic Gas Valve

You're going to like the news about this product, introduced only a few months ago.

Already it's proving to be one of the most popular and most trouble-free thermostatic gas valves ever manufactured. And with good reason!

The V5163 has all the fine quality construction and first-rate engineering you always expect from Honeywell. Yet the cost is *low*—low enough so dealers can sell it in *volume* to space-heater owners!

Check these outstanding features:

Bellows thermostat, valve, minimum flame adjustment and the safety pilot are all included in this one neat, compact unit. The thermostat measures room temperature and modulates the flow of gas from full volume to a pre-determined, pre-set minimum flame.

The safety pilot provides 100% shut off in case of pilot failure. A safety lighting feature is incorporated so the main line valve cannot be opened until the pilot has been established. And this unit is easy and inexpensive for dealers to install!

So don't fail to investigate and promote the use of the new V5163. For full facts call your local Honeywell office. Or mail the coupon today.

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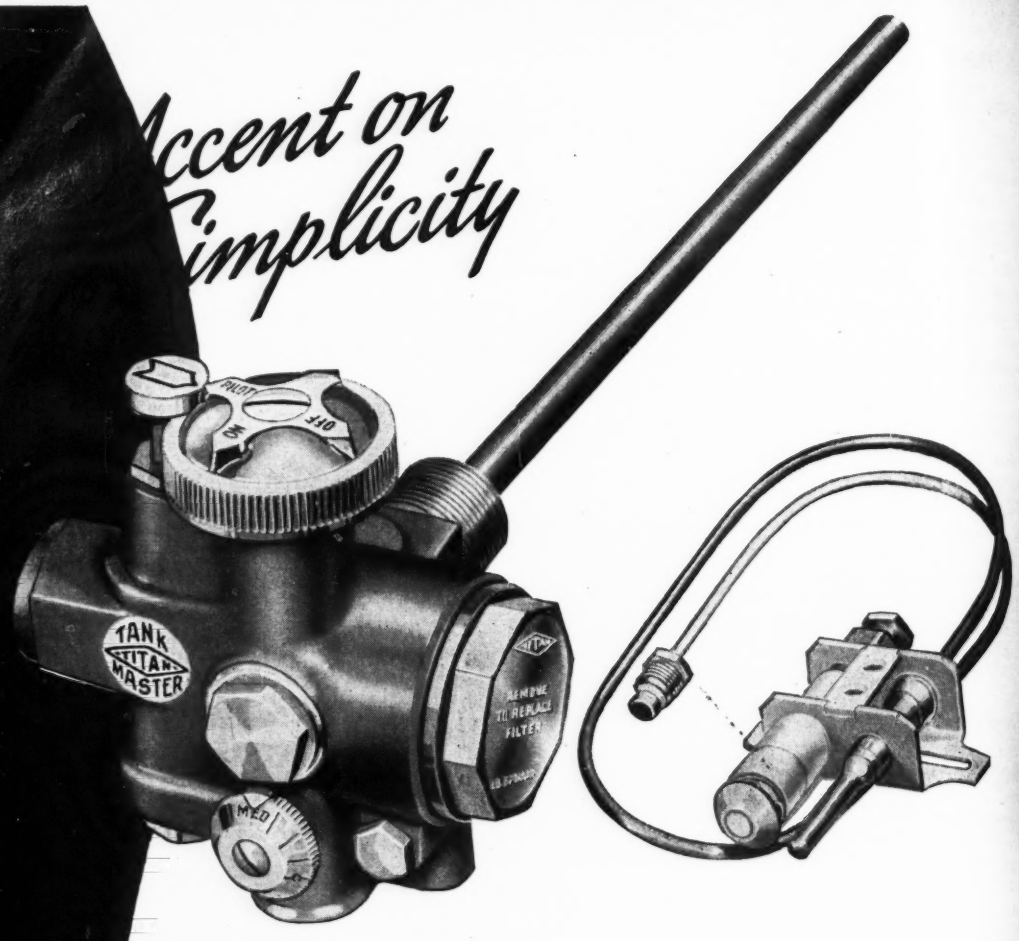

TITAN TANKMASTER...

The Outstanding Water Heater Control

Has combination thermostat and automatic safety shut-off, designed with independent valves, one actuated by rod and tube thermostat mechanism, the other by thermo-couple means.

The automatic shut-off valve provides safety in the event of accidental pilot flame failure. These independent valves, each for its own function, are easily accessible without removal of the combination control from the tank.

TITAN TANKMASTER has an enviable reputation for rugged construction—a fact borne out by actual field reports.

Write for complete information and specifications.

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simplification plan. Under the SEC order, Southwestern Development Co. was authorized to divest itself of Canadian River stock and to distribute its 42.5% stock interest in Colorado Interstate to Southwestern stockholders.

After two years of negotiations, the Gas Service Co., Kansas City, has taken over Central West Utility Co.'s distribution systems in Kansas City, North and Avondale. More than 3000 customers were affected by the switch and are now assured a gas supply sufficient for normal home heating.

Manufacturers

Blaw-Knox Sets Up New Research Department

Dr. H. B. Coats

A research and development department has been organized by the chemical plants division of Blaw-Knox Co., Pittsburgh, with Dr. H. B. Coats as director. Among the functions of the new department will be the study and evaluation of new processes with special attention to development of industrial applications of atomic energy.

Dr. Coats was associated with the Leslie Laboratories at Ann Arbor and the Upjohn Co., Kalamazoo, before joining Blaw-Knox in 1943. He has contributed developments in natural gas distribution and processing, resin manufacture, and solvent extraction and for the past year has been working with atomic energy.

American Standard Expands Sales Forces in Field

A general expansion of its field sales force, including the establishment of two additional supervisory sales districts, six new offices, and 13 promotions, was put into effect Jan. 1 by American Radiator & Standard Sanitary Corp., Pittsburgh. Six district offices will now supervise the operations of 28 sales offices throughout the country.

J. A. Hickman, Atlanta manager, has been named East Central district manager. He will headquarter in Cleveland, supervising the office there and those in Detroit, Cincinnati, and Pittsburgh. The second new district is South Central, with L. L. Graves, former Denver manager, in charge. It includes Kansas City, St. Louis, Omaha, New Orleans, and Dallas.

The six new sales offices and their managers are: New Orleans, Donald E. Sander from the Dallas office; Cleveland, George W. Palmer of Newark; Omaha, Robert F. Henderson from Kansas City; Long Island, L. R. Graves from New York; Jacksonville, Fla., Albert J. Ellison from Atlanta; and Salt Lake City, Robert G. Holmes from Denver.

Five other promotions included John E. Huey from assistant manager to manager at Atlanta, Karl H. Smith from salesman to Denver manager, F. R. Dannies to Milwaukee manager, Ross E. Bishop to assistant manager at Minneapolis, and Howard A. Steiger to a similar post at Newark.

New Koppers Lab to Step Up Gasification Studies

An enlarged and more unified program of research, with a major portion of the work centered at its new laboratories now nearing completion at Verona, Pa., is being undertaken by Koppers Co. Inc., Pittsburgh. The firm has purchased a plant site which it formerly leased at Verona, rearranged its buildings, and added a new one which is to contain administrative offices, a research library, and conference rooms.

Dr. G. F. D'Alelio, vice president and manager of the research department, predicts that by 1953 the company may have about 200 chemists, physicists, engineers, and technicians at Verona. A pilot plant to make gasoline from coal by the hydrogenation process is currently under way there. It will be operated by the company's newly formed fuels processing section, a part of the research department.

The new section is expected to step up Koppers research in coal carbonization and to probe more deeply into gasification and hydrogenation of coal, with particular emphasis on the chemicals which may be produced.

Detroit Trims Range Price

A substantial price reduction in two models of its five-model gas range line was announced last month by Detroit-Michigan Stove Co., Detroit. The cut applies to wholesale prices paid by the firm's dealers.

L. E. Clancy, director of sales, said that despite limited production and the attendant increase in cost per unit, prices are being reduced on the lowest priced, high volume ranges without sacrificing quality.

Models affected are the Detroit Jewel 8100 and 81007 and the Garland 5100 and 51007, all 38-in. divided top ranges with oversize ovens.

Another price cut was announced by the Home Appliance Division of Murray Corp. of America, Chicago, on six gas and seven electric models.

Newsnotes

Three American Radiator & Standard Sanitary Corp. plants have been cited by the Economic Cooperation Administration for their role in supporting joint American-European efforts to strengthen the free nations of Europe against communism. Certificates of cooperation were received by American-Standard managers in Louisville, Bayonne, and Baltimore for escorting European industrial and educational teams through their plants.

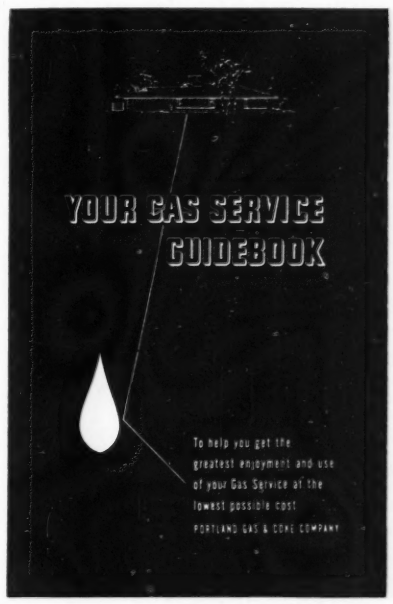
R. L. Polk & Co., independent market research firm, recently conducted a survey among food serving establishments listed in Duncan Hines' *Adventures in Good Eating* to determine what makes of commercial ranges and broilers were used. Detroit-Michigan Stove Co., Detroit, reports that its Garland range is in use in 58% more restaurants than the range second in preference, and its Garland broiler was named 35% more times than the next nearest brand.

"More Manpower Means More Salespower!" was the keynote slogan at the year-end sales meeting held last month by Timken Silent Automatic Division, Jackson, Mich. Good news for the regional and district managers who gathered for the four-day session was the company's announcement that its dealer retail sales force will be substantially increased during 1952.

On Jan. 1 Minneapolis-Honeywell Regulator Co., Minneapolis, put into effect a new premium prize plan for heating dealers. Coupons, redeemable for name brand merchandise, will be contained in every Chronotherm carton furnished by suppliers. A premium booklet illustrates and describes the 45 items available.

Sharples Chemicals Inc., Wyandotte, Mich., has been merged with Pennsylvania Salt Manufacturing Co., although it will continue to operate as a separate unit. A majority of Sharples stock has been exchanged for Pennsalt stock.

New York State Natural Gas Corp., Pittsburgh, has awarded a contract for the design and procurement of a gas dehydration plant to the chemical plants division of Blaw-

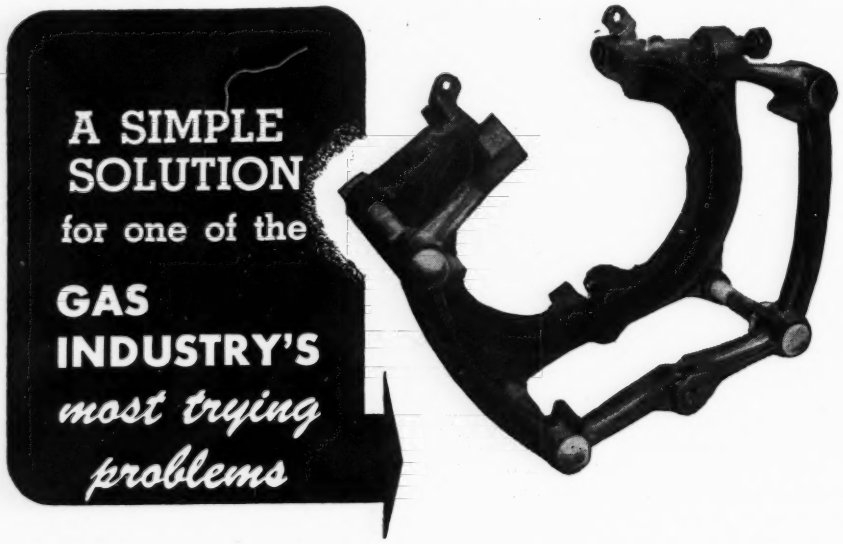

YOUR GAS SERVICE GUIDEBOOK
To help you get the greatest enjoyment and use of your Gas Service at the lowest possible cost
PORTLAND GAS & COKE COMPANY

Portland Issues Guide

Customers of Portland (Ore.) Gas & Coke Co. should have at their fingertips answers to all the usual questions about the cost of gas, services offered by the utility, appliance maintenance, and how to read a meter.

Reproduced above is the cover of a comprehensive 12-page booklet recently mailed to the utility's 100,000 customers. Each booklet was accompanied by a letter inviting further inquiry.

THE NORMAC BELL JOINT CLAMP



Solves Your Joint Repair Problems • Quick • Easy • Permanent

Installed in small pavement openings. Available in all standard sizes from 3" to 12". A simple set of tools cleans the joint, installs the clamp . . . often in only a quarter of an hour. SAVES TIME. SAVES MONEY and the repair is permanent. Designed for all conditions particularly where pavement repair costs are prohibitive. Such small opening repairs are scarcely noticeable when pavement is replaced.

Normac Clamps can be installed in large as well as small openings.

Norton-McMurray hold definite leadership in the development of methods for installation and rehabilitation work through small openings. We welcome the opportunity to help solve a problem you may have—tell us about it.

Write for our catalog describing our complete line of

COUPLINGS . . . FITTINGS . . . SERVICE TEES and ELLS . . . SLEEVES . . . COMPRESSION-END COCKS . . . METER BARS and BRASS FITTINGS for copper pipe.

6 inch Normac Clamp being lowered into hole for installation

6 inch Normac Clamp in service after installation

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Method and product covered by U.S. Patents, Nos. 2,163,261 and 2,178,286.

Knox Co. To be located in Clinton county near Renovo, Pa., the packaged unit will employ diethylene glycol to remove water vapor from 60 MMcf of natural gas daily from Leidy field.

American Car & Foundry Co., New York, collected 19,883 gross tons of steel scrap from its 12 plants during an intensive drive started in January 1951. A special representative was appointed to inspect the plants and make a survey of obsolete industrial equipment which could be scrapped. Each individual workman also served as a "scrap detective."

Regulation

Consumer Goods Output For Second Quarter Cut

Production of consumer durable goods in the second quarter of 1952 will be about 10% below the first quarter level, according to the Defense Production Administration.

In announcing second period allotments of steel, copper, and aluminum, DPA has attempted to sustain production at a "protected minimum level" designed to prevent future shortages of important equipment, sustain employment at the highest possible levels consistent with the supply of critical materials, and permit sufficient production to support economic stabilization objectives.

The building materials division (water heaters, central heating equipment, unit heaters, and domestic incinerators) will take the biggest cut in steel, 23.7% less than in the first quarter. The division will get 1.3% less copper and 2.6% more aluminum. For consumer durable goods .2% more steel has been allotted, 9.5% less copper, and 2% less aluminum.

A recent change in NPA regulations will tighten the self-authorization base for small users of copper, steel, and aluminum and will give manufacturers permission to accept delivery of controlled materials shipments which are delayed to a subsequent quarter without charging them against future allotments. These actions were taken in amendments to the Controlled Materials Plan rules.

Sulfur Tagged for Defense

Producers of sulfur and sulfuric acid will channel more of their output to meet military and defense requirements during 1952, according to recent action taken by the National Production Authority.

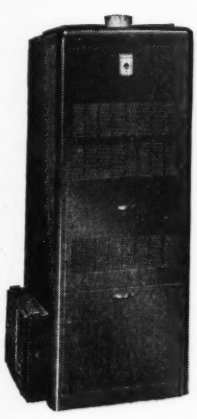
The sulfur order, as amended, restricts its use to 90% of use during 1950 and makes it possible for NPA to support military and defense needs by issuing directives to sulfur suppliers. The actions were taken in accordance with a sulfur conservation program outlined by the Defense Production Administration.

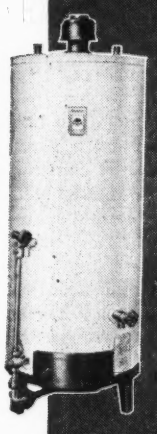
Fowler Named NPA Head

Secretary of Commerce Charles Sawyer recently announced his appointment of Henry H. Fowler as administrator of the National Production Authority. Mr. Fowler, who has been serving as NPA deputy administrator since September, succeeds

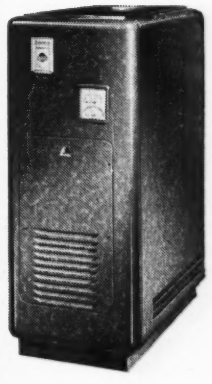
AMERICAN-Standard

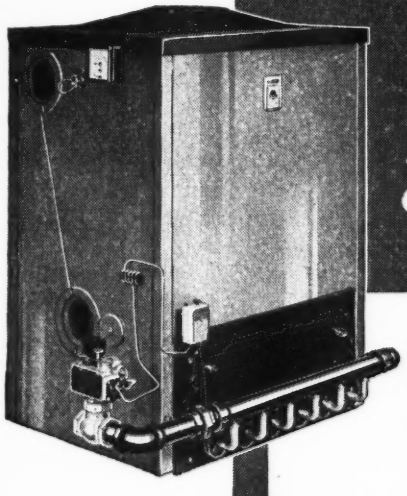
First in heating . . . first in plumbing





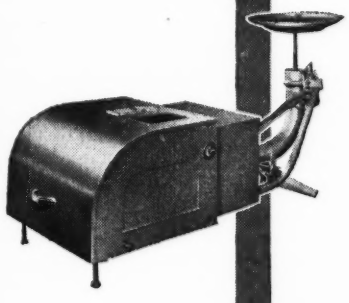
No name in heating enjoys greater public acceptance

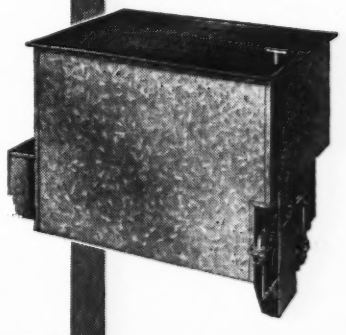




Surveys show greater preference for American-Standard Heating Equipment than for any other brand on the market. Add to this the powerful impact of the industry's greatest national advertising program; and products that are the finest that money can buy, and you can be confident that you are recommending a top line . . . and that your customers will respect your judgment.

American Radiator & Standard Sanitary Corporation, Pittsburgh, Pa.





LOOK FOR THIS AMERICAN-Standard PRODUCTS MARK OF MERIT

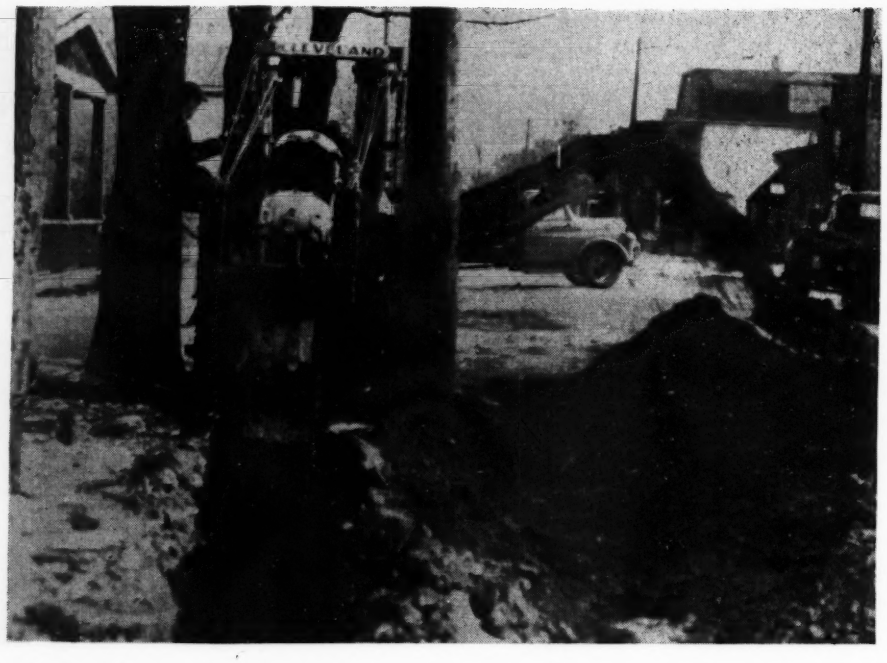
Serving home and industry

AMERICAN-STANDARD · AMERICAN BLOWER · CHURCH SEATS · DETROIT LUBRICATOR · KEWANEE BOILERS · ROSS HEATER · TONAWANDA IRON

in *TIGHT* spots
on *TIGHT* schedules
for *TIGHT* budgets

CLEVELAND BABY DIGGER

Proved Performance Pays Off



• More than 30 years of close engineering cooperation with gas utilities have built for CLEVELANDS a record of *proved performance* in the specialized field of gas line trenching operations. CLEVELANDS have earned this reputation by delivering maximum trench production for every operating dollar—no matter how tight the spot, the schedule or the budget.

The BABY DIGGER profitably performs your three jobs—mains, extensions and services... gets *to* the job fast and safely by truck and trailer... *does* the job when it arrives, regardless of soil or terrain. That's why gas utilities for years have standardized on *dependable* CLEVELAND BABY DIGGERS.

SEE YOUR LOCAL DISTRIBUTOR FOR THE COMPLETE CLEVELAND STORY.

THE CLEVELAND TRENCHER CO.
"Pioneer of the Small Trencher"
20100 ST. CLAIR AVE. • CLEVELAND 17, OHIO

Manly Fleischmann, now Defense Production Administrator.

Another change in NPA is the appointment of Paul B. Andrews to succeed Joseph W. Mullally as deputy director, copper division, metals and minerals bureau. For the past year Mr. Andrews has been chief of the brass mill branch, copper division. His career began with the Mueller Co., Decatur, Ill., and he is currently on loan to the government from Revere Copper & Brass Inc.

New York Seeks Public Hearings on Pipeline Jobs

A resolution to set up broader safety precautions for natural gas installations has been proposed by two New York legislators. It would require the state public service commission to hold public hearings before allowing any natural gas pipelines or facilities to be constructed.

Sen. F. S. McCullough of Westchester and Assemblyman A. G. Hatch of Rochester said that "there is now no assurance that high pressure pipelines, compressor stations, and other facilities are being constructed, located, and operated in accordance with any uniform standards determined to be sufficient to protect the public safety, health, and welfare."

The McCullough-Hatch resolution would direct the commission to study routes of new lines, their capacity and load, and to consider the type of site proposed and set standards for proper locations. The regulatory commission would also be required to adopt interim rules on natural gas facilities and to report back to the legislature with recommendations for laws.

DPA Lists Basic Materials

To serve industry, the armed forces, and government, a "List of Basic Materials and Alternates" is being published by the Conservation Division, Defense Production Administration. It will be issued about every two months.

Purposes of the list are to reflect the relative availability of certain basic materials and to help conserve critical materials by indicating more available alternates.

Nearly 400 materials are grouped alphabetically within their commodity classifications according to whether supply is (1) insufficient for essential demand, (2) in approximate balance with essential demand, or (3) fair to good.

Regulatory Newsnotes

Because manufacturers' activities are becoming increasingly dependent upon the directives of government control agencies, GAMA has issued a 1952 directory of such agencies. Although many changes—particularly in personnel—are expected, regular operating branches and divisions will undoubtedly remain the same. Field offices have also been included.

Attorney General Price Daniel has promised prompt action on a request of the Texas Railroad Commission to intervene in support of the FPC's order declaring that it does not have jurisdiction over Phillips Petroleum Co. Five cases have been filed asking the

U. S. Court of Appeals for the District of Columbia to set aside the FPC order. Mr. Daniel last month ordered preparation of petitions of intervention.

Loring T. Cramer, with a 35-year background of experience in the petroleum industry, was recently sworn in as chief of the petroleum branch, transportation, public utilities and fuels division of the Office of Price Stabilization. Mr. Cramer replaced O. D. Judd, who left to accept a position with Sinclair Refining Co., Washington, D. C.

Sales and Promotion

Water Heater Campaign Moves Into High Gear

"Ask *your* plumber," the half-million dollar water heater advertising campaign conducted by GAMA and AGA, gets under way this month.

The first two ads in a five-month national program are appearing in *Better Homes & Gardens* and *House & Garden.* These plus succeeding insertions in other national magazines in March, April, September, and October will take a $110,000 slice of AGA's share of the appropriation.

On top of this, the individual manufacturers are going to spend $375,000 to publicize their own brand names nationally.

The campaign, which will continue on a year-long basis, is intended to attract the customer to the dealer and to create a more direct and profitable relationship between the manufacturer and his outlets.

The "ask your plumber" tag is used as a means of urging customers to check with their plumbers when they discover plumbing troubles, however minor. With this entree, plumbers are in a good position to put their sales abilities to work.

Localized appeal will be used in the ads, each of which will feature a plumber dealer from a different section of the country in the act of making a sales demonstration.

(For more information on this and other nationwide promotions soon to start, see *GAS,* January, p. 38.)

Culinary Crown Sought

When 23 women lined up at the Brooklyn Academy of Music for a giant "cook-off" Jan. 23, they faced a unique challenger for the housewife's culinary crown—a mere male.

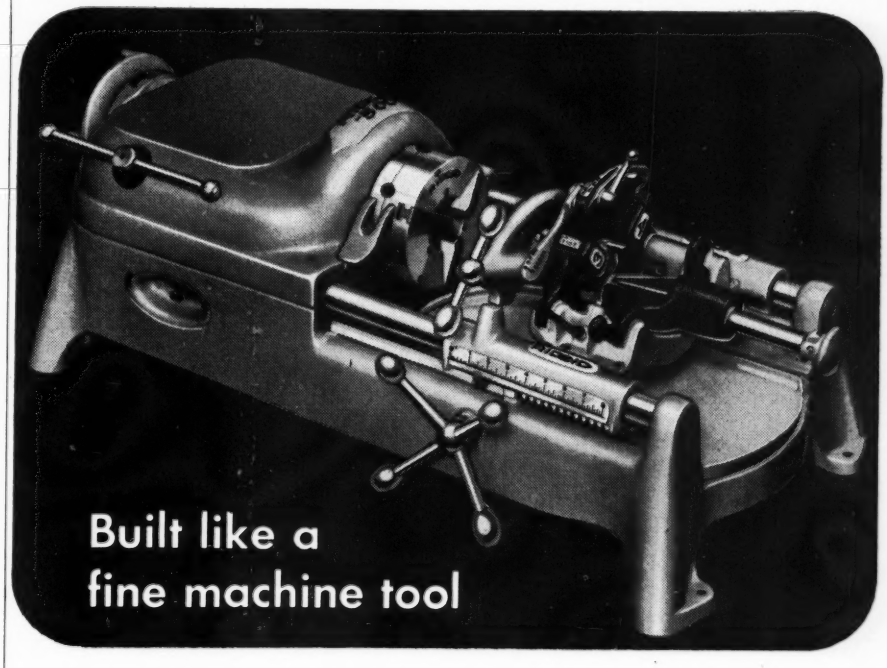
William McCrea, a 30-year-old New York fireman, qualified as a finalist in the competition with his old fashioned beef stew—the "Fireman's Special." The contest, conducted by a local radio station for a manufacturer of food products, required entrants to cook up palatable, original, and economical dishes using the manufacturer's tomato paste.

At presstime, neither the winner of first prize, a $1000 U. S. bond, or of the second prize, a Caloric gas range, had been announced. Every competitor had an excellent and equal chance, however, because only gas ranges were used in the "finals."

Announcing THE GREAT NEW "500"

RIDGID

PIPE & BOLT THREADING MACHINE



Full of typical RIDGID Improvements

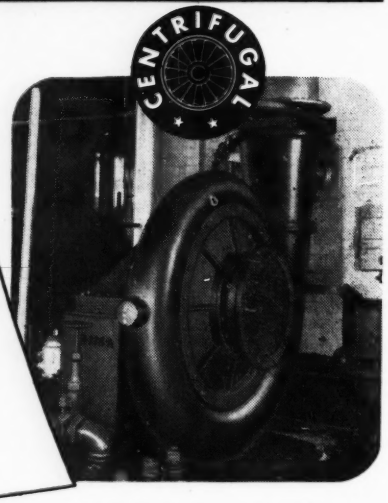
- Range ⅛" to 2" pipe; ¼" to 2" bolts.
- Cutting, threading and reaming tools operate independently and right up to chuck, swing up out of way when not in use.
- New RIDGID quick-opening quadritype, dualtype and monotype die heads save time and work.
- Concealed oil system, reversible pump, no priming.
- More than 20 other efficiency improvements—see this remarkable new RIDGID "500" at your Supply House!

THE RIDGE TOOL CO. • ELYRIA, OHIO

★★★ RIDGID Work-Saver Pipe Tools ★★★

No more "*off the cuff*" decisions when you compare blower values

- ☐ Choice of Rotary or Centrifugal
- ☐ Capacity matched to the job
- ☐ Easy accessibility
- ☐ Ruggedness
- ☐ Ease of installation
- ☐ Ability to handle overloads
- ☐ Long-time durability
- ☐ Freedom from breakdowns
- ☐ Low maintenance costs
- ☐ Engineering assistance
- ☐ Proved reputation of maker
- ☐ Customer satisfaction



Type OIB Single-Stage Centrifugal Blower used in manufacturing water gas for southern utility. Driven by steam turbine through flexible coupling. Capacity 12,000 cfm.

If you are considering new equipment for handling gas or air, we suggest you examine the essential values listed above, before you make your final selection. These factors will help you determine the unit that will best match your specific application, and that will give you the most satisfactory, economical performance.

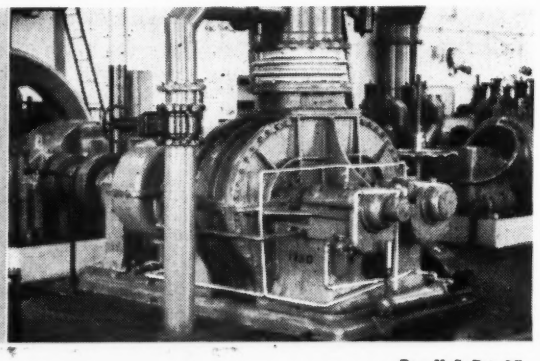
You'll find that R-C equipment rates high in every one of these essential factors. With capacities ranging from 10 cfm to 100,000 cfm or higher, at moderate pressures, and with the exclusive *dual-ability* line of Centrifugal or Rotary Positive types, you have a wide choice to meet the most exacting needs.

If you'd like to tell us about your specific problem, we'll gladly send detailed information for comparison, or supply engineering help from our 98 years of blower building experience.

ROOTS-CONNERSVILLE BLOWER CORPORATION
522 Oregon Avenue, Connersville, Indiana

ROTARY

Type RCGH Gas Pump in eastern gas plant. Capacity 6,750 cfm.



Reg. U. S. Pat. Off.

ROOTS-CONNERSVILLE
BLOWER BUILDERS R-C SINCE 1854
ONE OF THE DRESSER INDUSTRIES

CONSOLIDATED EDISON CO.'S Hunts Point plant, which began operations 25 years ago with two coke-oven batteries which could make 20 MMcf per day, now produces eight times that much gas. Examining the first chunk of coke made at the plant are Joseph Kirincic, coal handling foreman; F. J. Thoene, plant superintendent; Oliver H. Smith, gas production manager; and Earl L. Griffith, vice president.

Expansion

Construction Budgets Set; Lone Star's Biggest Ever

Gas companies began releasing their 1952 construction budget estimates last month, and all indications point to another tremendous year in building activity.

At least one company—Lone Star Gas Co., Dallas—is going to spend more than ever before. The 1949 record of $26 million will be topped by more than $5 million, President D. A. Hulcy revealed, with $31,040,400 set aside for expansion of the 375-town system. Almost every conceivable phase of operations from the well to the burner tip is included.

The expenditures will keep pace with an expected high growth level. During 1951, Lone Star added 51,000 new customers to bring its total to 600,000, and in 1952 anticipates the addition of another 38,000. Outlays during the past year exceeded $21.5 million.

Mr. Hulcy expressed optimism over the company's ability to meet the new requirements despite shortages which "may hamper the program to some extent."

Two Consolidated Gas System companies, New York State Natural and Peoples Natural, both of Pittsburgh, are in the midst of a two-year spending program costing $60.7 million. Peoples' 215,000 customers in western Pennsylvania and New York State's wholesale customers in both Pennsylvania and New York are benefiting from the big budget. Biggest single items are in the development of storage fields, with New York Natural participating with Texas Eastern Transmission Corp. in work on the $40 million Oakford storage pool and completing two others on its own, the $9 million South Bend pool and the $2.8 million Sabinsville pool.

In San Francisco, Pacific Gas & Electric has allotted $162 million for the year's work, but the lion's share—$132 million—will go to the electric department. All told, the company expects post-war construction totals to hit $1 billion in 1953.

Materials shortages may delay completion

of some jobs, according to President James B. Black, but "we do not expect these delays to materially affect the amount of construction expenditures budgeted for 1952."

Public Service Electric & Gas Co., Newark, is another combination company with ambitious plans. The gas department will get $24 million of a total budget of $84 million. With more natural gas expected during 1952, outlays for production will take a smaller bite of the total—23%. Public Service's capacity has more than doubled since 1946.

An unannounced share of its $16 million allocation for 1952's construction has been set aside for expansion of Louisville Gas & Electric Co.'s gas system.

Ohio Fuel Gas Co., Columbus, expects to drop its sights by $2 million from the $24 million spent in 1951. Of 1952's budget, $8 million is for new pipelines, $7 million for its distribution system, $5.7 million for increased storage facilities.

Miscellany

Best Managements Honored

American Institute of Management certificates of excellence for outstanding management in ten fields have been awarded to 298 firms out of 3000 considered for the honor.

Among those deemed outstanding were Dresser Industries Inc., Dallas; Pacific Lighting Corp., San Francisco; and Washington (D. C.) Gas Light Co.

One of the major purposes of the awards, according to Jackson Martindell, president of the New York institute, is to encourage management in all lines of business to give due consideration to the 10 factors deemed important by AIM. A certificate proves that the recipient has attained a proper balance in its efforts and objectives, he said.

Fast Meters Worry Utility

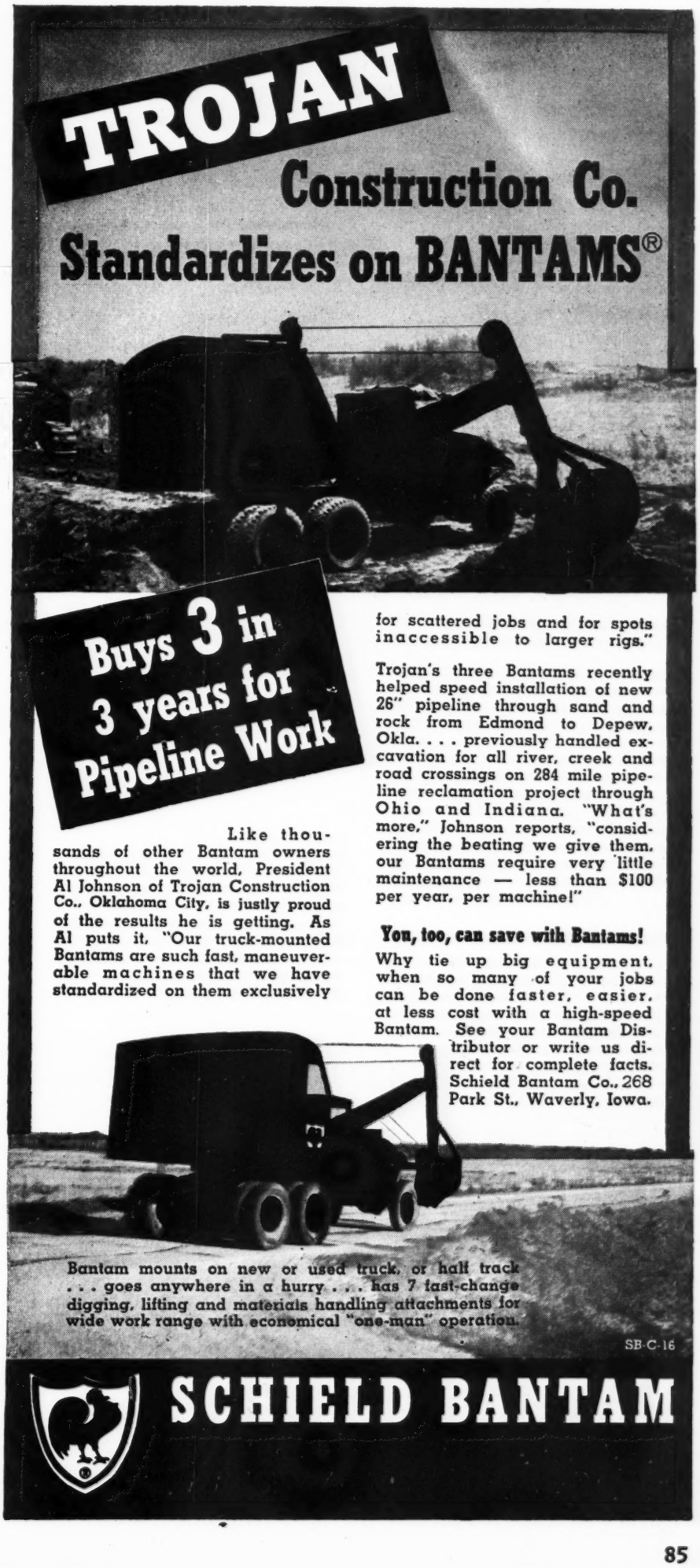
Henry Rohrs, vice president of Elizabethtown Consolidated Gas Co., Elizabeth, N. J., last month revealed that 45% of 14,000 gas meters checked recently in Union and Middlesex counties were found to be running too fast.

In a meeting with the state public utility commission, Mr. Rohrs said it would take the rest of this year to check another 14,000 meters and nearly four years to check the 120,000 meters serving the two counties.

On a utility commission order, the company refunded $20,647 to 8281 families last year. The meter speedup was blamed on the recent switch from manufactured to natural gas.

Miami Beach Conversion

Appliance specialists from North American Conversion Co. have been busy in Miami Beach, Fla. preparing appliances of 35,000 customers of Peoples Water & Gas Co. to receive 709-Btu gas. The firm has been serving 525-Btu gas made from coal, coke, steam, and oil. Following modernization of the plant, oil has replaced coal and coke.


TROJAN
Construction Co.
Standardizes on BANTAMS®
Buys 3 in 3 years for Pipeline Work
Like thousands of other Bantam owners throughout the world, President Al Johnson of Trojan Construction Co., Oklahoma City, is justly proud of the results he is getting. As Al puts it, "Our truck-mounted Bantams are such fast, maneuverable machines that we have standardized on them exclusively for scattered jobs and for spots inaccessible to larger rigs."
Trojan's three Bantams recently helped speed installation of new 26" pipeline through sand and rock from Edmond to Depew, Okla. . . . previously handled excavation for all river, creek and road crossings on 284 mile pipeline reclamation project through Ohio and Indiana. "What's more," Johnson reports, "considering the beating we give them, our Bantams require very little maintenance — less than $100 per year, per machine!"
You, too, can save with Bantams!
Why tie up big equipment, when so many of your jobs can be done faster, easier, at less cost with a high-speed Bantam. See your Bantam Distributor or write us direct for complete facts. Schield Bantam Co., 268 Park St., Waverly, Iowa.
Bantam mounts on new or used truck, or half track . . . goes anywhere in a hurry . . . has 7 fast-change digging, lifting and materials handling attachments for wide work range with economical "one-man" operation.
SB-C-16
SCHIELD BANTAM

American Meter Dedicates Dallas Plant

Prior to the formal opening of its new orifice meter assembly plant and warehouse at Dallas, American Meter Co. held its annual sales meeting at the plant. After the three-day meeting, during which 1951 operations were reviewed and 1952 plans discussed, an open house was held.

Donald Holtz, insert, is manager of the Dallas plant.

Other executives, shown in the reception room, are William B. Ashby, secretary; T. A. Bracken Jr., treasurer; A. F. Benson, vice president, engineering; C. B. Dushane Jr., vice president, sales; W. G. Hamilton Jr., president; A. McBeath, controller; A. E. Weingard, vice president, production; D. C. Struble, vice president, purchasing; and D. C. Wiley, vice president, research.

A special portable shop was set up by the conversion engineers to complete the changeover. Cost of the conversion is estimated at $200,000.

Miscellaneous

Acquisition of the Fielden Instrument Corp. of Philadelphia by Robertshaw-Fulton Controls Co., Greensburg, Pa. has been completed and will enable Robertshaw to offer many combinations of control valves and regulators with electronic instrumentation, as well as enlarging its potential market, John A. Robertshaw, president, recently announced. Fielden will operate as a wholly owned subsidiary.

A feeder pipeline to carry gas to Paris from Saarland cokeries and Lorraine factories has been assured with the adoption by the French National Assembly of a bill providing for certain public works investments. The bill provides for a 40 million franc project to begin in the spring and to start supplying surplus gas to the French capital by the end of 1953.

Twenty thousand shares of Humble Oil & Refining Co. stock valued at $1,570,000 have been presented to Rice Institute, Houston, for the establishment of the Harry Carothers Wiess Chair of Geology. The gift was made by Mrs. Olga Wiess, widow of the late Humble president. At the 1951 dividend rate, annual income would amount to $50,000.

WOW!

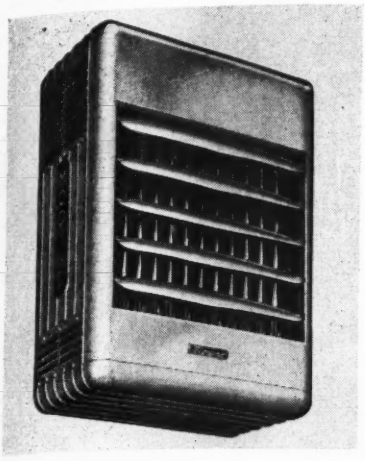
The Gal would no doubt be welcome on a desert isle, back row of a movie, Saturday night square dance or any other civil (or un-civil) occasion. All Right, All Right, the Gal's name is Maude and her phone number is Webster 1941. Now, will you read the rest of this?

You'll admit she's pretty, but, have you seen one of our insulating bushings designed especially for gas meter service? How about letting us send you testing samples, the bushings that is, they'll speak for themselves. (Sure wish I had that Monkey's job!)

ALL TYPES OF INSULATION
CALL • • WIRE • • WRITE

SERVICE ENGINEERS, INC.
Manufacturers of Industrial Plastic Products
3030 W. Pafford | P. O. Box 11068 | Fort Worth 9, Texas

NEW PRODUCTS



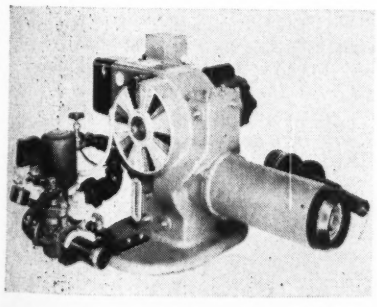
Unit Heaters

Some of the advantages claimed for these unit heaters are reduction in weight and bulk, faster response to thermostatic control, balanced heating performance, and lengthened service life. Heat exchanger and burners are stainless steel for maximum resistance to rust and acid action of corrosive gases, and heat exchanger tubes are dieformed to provide their own combustion chambers. Each tube is individually fired for most effective and uniform heat transfer. Elimination of the conventional combustion chamber makes it possible to heat all tubes evenly, according to the manufacturer.

Elongated burner ports reportedly have about four times the free area of conventional drilled ports, minimizing clogging and maintenance. Access to burner, manifold, and pilot light is provided by means of a hinged casing bottom which may be dropped by removing two wing-screws.

Model 105 has a Btu input of 105,000. This unit weighs 106 lbs and is 30 in. high, 21¾ in. wide, and 12½ in. deep. Five models—from 65,000 to 165,000 Btu input—are AGA approved and equipped with automatic controls, bonderized casings, and built-in draft diverters and fan guards.

Modine Manufacturing Co., Racine, Wis.
Model: 105 illustrated.



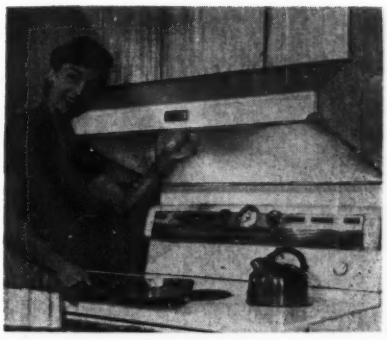
Combination Burners

One advantage claimed for this line of combination oil and gas burners is the incorporation of a forced air draft system which provides a single blower fan for all air for combustion, assuring fire control under all atmospheric conditions. Both gas and air are accurately controlled to give high CO_2 with greatest efficiency, the manufacturer states.

Models range from 720,000 maximum Btu in the AMG-2 to 8,700,000 Btu in the AMG-7. On all burners low fire start is accomplished with either gas or oil; on the two largest sizes (AMG-5 and AMG-7), full modulation between high and low fire is available.

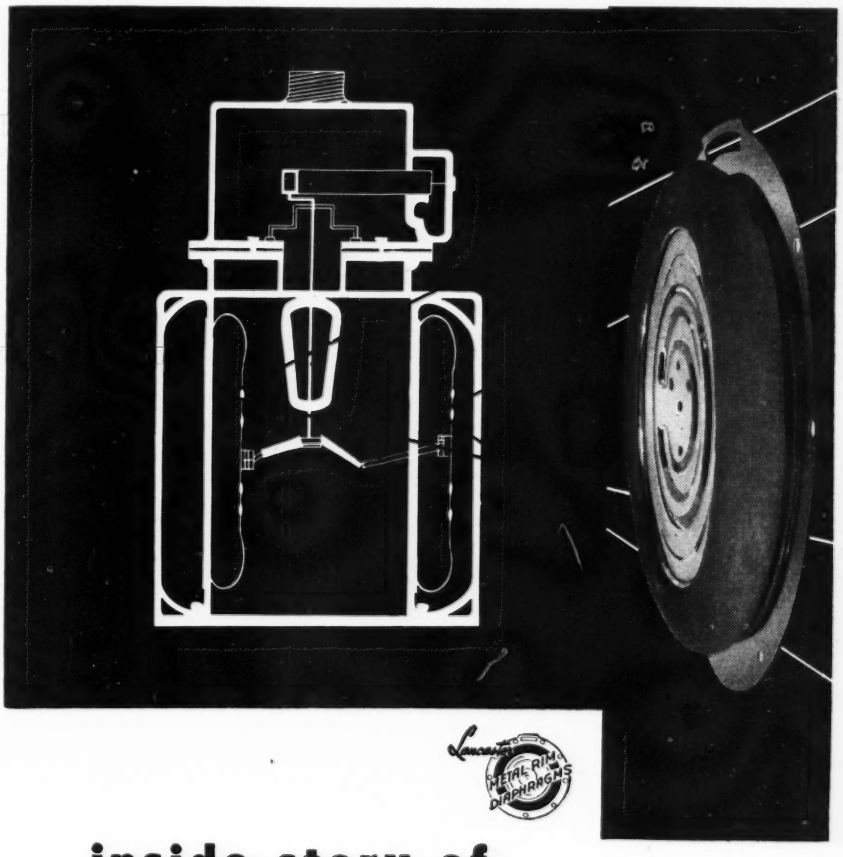
Electronic controls guarantee that the main gas valve cannot be opened unless a pilot flame is established.

Model: Hev-E Combination Burners.
Cleaver-Brooks Co., 326 E. Keefe Ave., Milwaukee 12.



Ventilating Hood

This kitchen ventilating hood fits low over the range and traps cooking by-products



inside story of improved meter performance

Continuous engineering and construction improvements keep Lancaster Metal Rim Diaphragms out in front—solving meter problems and breaking service records for greater accuracy and longer life. Send for a sample and see why Lancaster Metal Rim Diaphragms offer so many more advantages for improved meter performance.

METER PARTS CO.

at their source, thus increasing the efficiency of the exhaust blower unit. Back panel extends to cooking top, and lights and switches are incorporated under the hood, which is available with or without a blower unit. Cabinets over the stove conceal the blower unit and vent and permit a symmetrical kitchen design.

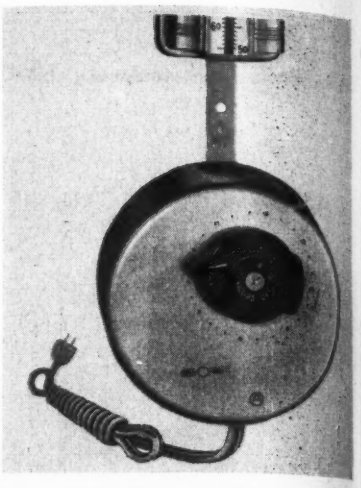
Two blowers — 300 or 425 cfm — are available. Aluminum foil filter prevents grease accumulation in blower and may be cleaned with any detergent.

The hood is made in two styles: Provincial scalloped design in copper baked enamel finish and Aristocrat, a modern design in white or colored enamel. Welded, one-piece construction results in a minimum of exposed screw heads, cracks, and crevices.

Models: Provincial and Aristocrat.
Stanthony Corp., 6900 San Fernando Rd., Glendale 1, Calif.

Thermostat Control

A combination timer-heater, powered by a Telechron fractional horsepower motor, operating from 110-volt a-c 60-cycle wall outlets is called the Heet-O-Matic and is designed for application to thermostats regulating domestic stoker-fed gas and oil heating systems. All working units are enclosed



in a urea-formaldehyde plastic case.

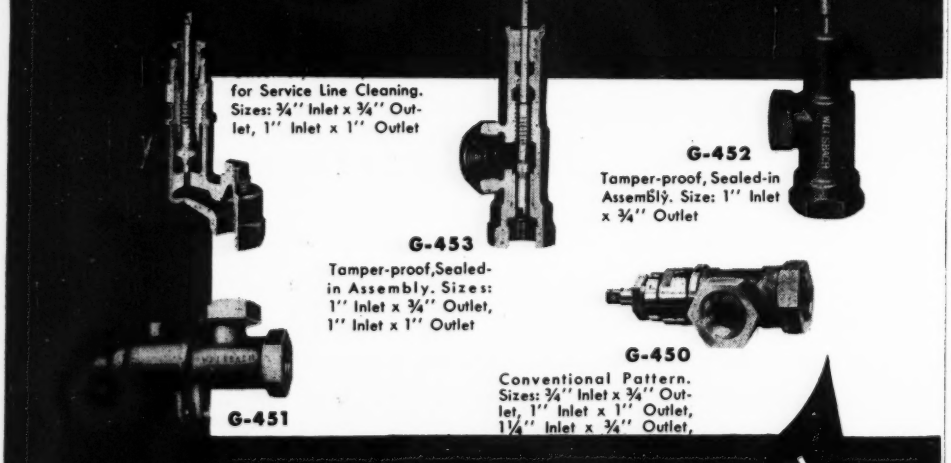
It is reported that no rewiring of thermostats or major electrical alterations are necessary for installation. A one-screw attachment of the unit to the thermostat and a 6-ft cord plugged into the nearest outlet complete the installation.

The Heet-O-Matic is set only once, at the beginning of the heating season. Benefits claimed for it are low, comfortable room temperatures during sleeping hours and fuel cost savings between 10% and 12% annually.

Model: Heet-O-Matic Day and Night Thermostat.
Automatic Controls Corp., Ann Arbor, Mich.

Craftsmanship

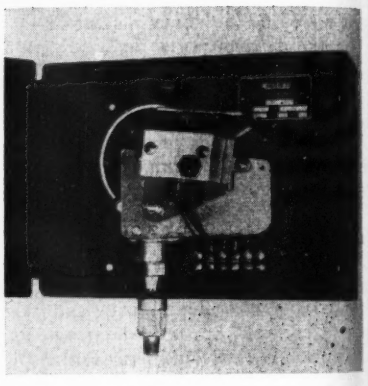
The built-in quality in Welsbach-Kitson products is, like the results achieved by the


for Service Line Cleaning. Sizes: ¾" Inlet x ¾" Outlet, 1" Inlet x 1" Outlet
G-452
Tamper-proof, Sealed-in Assembly. Size: 1" Inlet x ¾" Outlet
G-453
Tamper-proof, Sealed-in Assembly. Sizes: 1" Inlet x ¾" Outlet, 1" Inlet x 1" Outlet
G-450
Conventional Pattern. Sizes: ¾" Inlet x ¾" Outlet, 1" Inlet x 1" Outlet, 1¼" Inlet x ¾" Outlet,
G-451

Q E D

The WELSBACH CORPORATION

1500 Walnut Street
Philadelphia 2, Pa.



Pressure Transmitter

A new electro-mechanical instrument for transmitting pressure measurements electrically to remotely located indicators, recorders, or controllers has been used successfully in a number of commercial applications.

The transmitter operates on the differential transformer principle, the tip of the bourdon tube being rigidly connected to a movable armature within the transformer coil, mounted in a fixed position. When pressure of air, steam, water, oil, or other fluids enters the tube, the tip of the tube moves. This motion positions the armature within the coil and an electrical signal is generated proportional to the amount of travel.

Accuracy of the bourdon tube pressure transmitter, including linearity and hysteresis effects is, in standard ranges from 15 to 5000 psi, ± 0.25% of full range; ranges 10,000 psi, accuracy ± 1% of full range. All transmitters are equipped with zero ad-

justment, and bleed valves are available where required for liquid service.

The armature requires only .01 gram force for its motion, and the primary element responds to the slightest pressure variations.

Model: Atcotran.
Automatic Temperature Control Co. Inc., 5200 Pulaski Ave., Philadelphia 44.

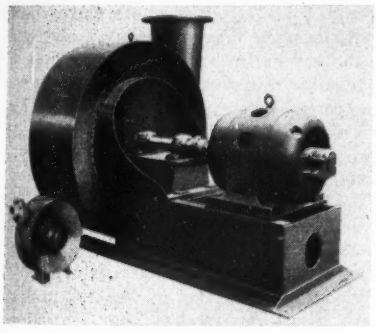
Metal Detector

Pavement-covered manhole covers, valve boxes, and survey pins may be located with this new single loop type metal detector specially designed for locating small near-surface metal objects.

In addition, it may be used to find hidden or lost weapons, tools, keys, property markers, coins, etc. under soil, rock, asphalt, cement, wood, brick, or water. Brick, wood, plaster, or adobe walls may be explored.

Objects are identified by an earphone tone and an indication on a visual meter. Weight is approximately 7 lb. Power is provided by dry cell batteries.

Model: Single Loop Metal Detector.
Fisher Research Laboratory Inc., Palo Alto, Calif.



Steel Blowers

A new line of fabricated steel blowers limited in size only by available manufacturing space includes standard models up to 200 hp. Models SG (multi-stage) and SM (single-stage) operate at 3500 rpm; model ST operates at 1750 rpm. Standard outlet pipe sizes run from 4 to 24 in., all flange fitted.

The smaller models, through 10 hp, are particularly useful for mezzanine or elevated mounting in either vertical or horizontal positions. Designed on a standard basis for air only, they can be adapted to the use of corrosive, poisonous, or explosive gases on special orders calling for stainless or spark-proof materials and special gasketing.

Blower outlets may be oriented in any of 14 positions depending upon the desired discharge angle and offset (from shaft center line). Delivered air pressures up to 3 psi (5.3 in. mercury) may be had. Constant pressure is maintained regardless of air volume, but power consumption is directly proportional to air volume. Thus, half-capacity usage means half-cost operation.

Models: SG, SM, and ST.
Lamson Corp., Billmyre Blower Div., Syracuse, N. Y.

TRADE LITERATURE

CRAWFORD FITTING CO., 884 E. 140th St., Cleveland 10—Catalog B-151 covers the complete line of Swagelok tube fittings available in brass, aluminum, steel, stainless steel, and monel. Dimensional information, cross section drawings, installation recommendations, and assembly instructions are included.

VICTOR EQUIPMENT CO., 844 Folsom St., San Francisco 7—Catalog 20-C presents complete information on the company's

A BURIED TREASURE

FOR

CORROSION CONTROL...

WITH

Standard Magnesium Anodes

If you have a corrosion problem, Standard Magnesium Anodes can *truly* be a *"Buried Treasure"* of savings for you.

HERE'S HOW . . .

A good anode is like a good car battery . . . it gives you efficient, long-lasting service at a minimum cost. That is what Standard Magnesium anodes offer.

Certified Spectrographic Analysis records are furnished with all anodes shipped, insuring the user that he is receiving a product that will deliver maximum current efficiency.

Write for our free booklet on corrosion control and let our engineering consultants explain how we can serve you.

Standard Magnesium Corporation
TULSA, OKLAHOMA

welding and cutting equipment. Illustrations and charts are designed to simplify selection and ordering.

SELAS CORP. OF AMERICA, Philadelphia 34, Pa.—"Heat Processing . . . With the Most Advanced Techniques and Equipment" is the title of a new bulletin which approaches heat processing through five basic questions: (1) What is to be heated? (2) What sections are to be heated? (3) Why is the material to be heated? (4) To what temperature or temperatures? (5) What is the heating time? The bulletin, S-7.1, illustrates the application of high production heating principles to solid and fluid products ranging in size from mill operations to delicate enameled pieces.

WELSBACH CORP., Kitson Div., 1500 Walnut St., Philadelphia 2 — Welsbach-Kitson gas stops, valves, and meter connections are described and illustrated in a new 4-page bulletin. Included are flat way brass standard and meter pattern gas stops, iron body service pattern with brass plug stops, and high pressure service valves.

CARBIDE & CARBON CHEMICALS CORP., Union Carbide & Carbon Corp., 30 E. 42nd St., New York 17—A 24-page booklet, "Stop Gas-Main Leakage," describes the properties and advantages of Carboseal anti-leak for stopping leakage in bell-and-spigot joints. This liquid saturates dried out packing and swells the jute and hemp fibers as much as 44%, according to the catalog.

This treatment, the booklet reports, gives as high as 100% reduction in leakage, eliminates a hazardous condition, checks vegetation damage, reduces maintenance costs, wets down rust and dirt in the mains, and keeps gas systems tight for years without retreatment. Methods used to introduce the liquid anti-leak into the mains are presented in detail. A system can be treated without uncovering every joint and without the need of continuous rehydration or fogging, the company says.

BALDWIN-LIMA-HAMILTON CORP., Philadelphia 42—Application of the Baldwin SR-4 fluid pressure measuring system in oil and chemical processing for automatic control and remote indicating and recording is featured in a new 4-page bulletin, No. 306. It covers the principles of the SR-4 bonded resistance wire strain gauge and pressure cells, electrical transmission of pressure variations with 4 to 8 volts and currents of less than 0.07 ampere, elimination of the fire and explosion hazard of oil or gas transmission to control panels, and the permanency and accuracy of the system.

SURFACE COMBUSTION CORP., Toledo, Ohio—Bulletin SC-155 describes exothermic and endothermic type atmosphere generators, and the gas generation processes are schematically diagrammed. Compositions of each gas atmosphere and the respective heat treat process applications are described. In addition, examples of furnace design applications for continuous or batch production controlled atmosphere heat treating are presented.

MILWAUKEE GAS SPECIALTY CO., Milwaukee 2, Wis.—A 100-page manual describing servicing of Baso automatic safety pilots is being distributed free of charge to gas appliance servicemen. The book's sections cover theory of operation, description of the pilots, disassembly and repair procedures, service suggestions, and parts catalog.

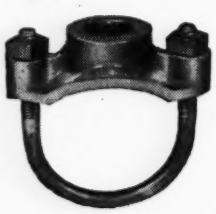
HAGAN CORP., P. O. Box 1346, Pittsburgh 30—A four-page illustrated bulletin describes the Hagan flow transmitter. Signals may be linear with flow or linear with pressure differential. Diagrams illustrate suggested uses and principles of operation. Copies of the bulletin, designated No. 2551, are available upon request.

CLARK BROS. CO. INC., Olean, N. Y.—"Balanced/Opposed Motor Driven Compressors" is the title of Bulletin 118. The text includes a discussion of the balanced/opposed principle, advantages of the design, description of various models, and illustrations of a number of installations.

MINNEAPOLIS-HONEYWELL REGULATOR CO., Brown Instruments Div., Station 40, Wayne & Windrim Aves., Philadelphia 44—A new 4-page specification sheet (No. 600) describes the company's indicating and recording thermometers. Construction and engineering details are included.

AMERICAN CAR & FOUNDRY CO., 30 Church St., New York 8 — A new 8-page bulletin describes and illustrates the company's lubricated plug valves. The cylindrical plug gives a round-cornered full pipe area port opening, the bulletin states.

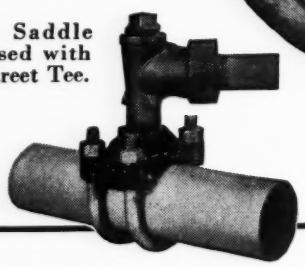
DRESSER SADDLES for Service Connections



Single Stirrup Malleable Saddle available in sizes 1½" to 4" I. D.

Two Stirrup Saddle available in sizes 2" to 12" I. D.

Dresser Saddle can be used with Dresser Street Tee.



Dressser Style 91 Pipe Saddles provide an economical method for making service connections to steel and cast iron pipe when other methods are not practicable.

These ruggedly built saddles are easy to install, and come equipped with specially compounded Dresser rubber gaskets suitable for practically all services. Because of their resilience, these gaskets keep the connection tight despite line movements, and permit working pressures considerably higher than those obtainable with lead gaskets.

Dresser Pipe Saddles are made in single and double stirrup models, in a complete range of sizes and with both American Standard and Mueller corporation taps. Also available from Dresser is a complete line of service fittings for all piping needs. Write for details and specifications.

DRESSER PIPE SADDLES

Dresser Mfg. Division (One of the Dresser Industries), 59 Fisher Ave., Bradford, Pa.
In Texas: 1121 Rothwell St., Houston • In Canada: Toronto, Ontario • Sales Offices: New York, Chicago, Houston, Philadelphia, San Francisco

"AND WE THOUGHT WE DIDN'T HAVE ANY SCRAP!"

"We don't make anything of steel ... so we didn't think we were concerned in the national scrap program.

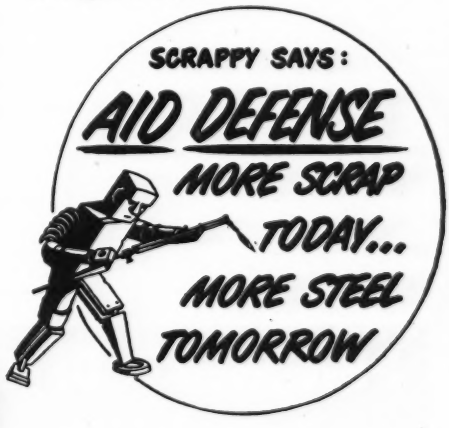
"Then we came to realize how badly *we* would be affected if steel products we *use* were shut off by the shortage of scrap.

"When we learned a *photographic film* manufacturer was able to collect 88 *carloads* of iron and steel scrap in his own plant—we began looking.

"We found plenty of idle metal that had rust on it and dust on it. Obsolete machinery. Outmoded equipment, jigs and fixtures. Broken parts—like wheels, chain, springs. Abandoned structures made of steel.

"We found plenty. And, knowing our best chance of *getting steel products* was by furnishing the raw materials for steel-making, we promptly called in our local scrap dealer.

"I'd urge *any* business to look over its premises with an eye out for scrap. Non-ferrous scrap is needed, too! Why don't *you* appoint one man—with authority—to act as *your* Scrap Salvage Director?"



This advertisement is a contribution, in the national interest, by

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CURRENT READING

CENTRIFUGAL COMPRESSORS on the Texas Eastern Transmission Corp. System — by E. A. Koenig. Published as Bulletin 117 by Clark Bros. Co. Inc., Olean, N. Y. This paper outlines how Texas Eastern used centrifugal compressors, the units which were originally installed on the Big Inch line.

U. S. PATENT NO. 2,562,748 — Heat Pump. Granted to Marvin M. Smith and Emory N. Kemler, assignors to Muncie (Ind.) Gear Works Inc. This invention relates to the use of the heat pump as a principal utility for space heating supplemented by heat derived from auxiliary equipment that utilizes fuel and furnishes power for operating the heat pump; and further, relates to means for increasing the efficiency of utilization of fuels for heating and cooling purposes through the employment of a heat pump operating on a reversed refrigeration cycle.

The main objects of this invention are to provide heat pump apparatus of sufficient flexibility to accommodate its operation to a wide range of natural temperature changes with a high average of mechanical efficiency; to provide improved means for operating the refrigerant cycle of a heat pump by a prime mover supplying auxiliary heat derived from combustion of fuel with such selective cooperation of different heat sources as to attain increased overall efficiency; and to provide an improved construction of such heat pump whereby heat may be selectively taken from different sources according to the current availability of such sources to meet particular requirements as regards space heating and cooling.

MEMBERSHIP DIRECTORY — New England Gas Assn., 41 Mt. Vernon St., Boston 8. A second edition of this comprehensive directory, which stirred a great deal of comment when it was published two years ago, has been mailed to NEGA members. Plans call for revision of the book every two years. Even more information is presented in the second edition than in the first. The eight parts include: (1) Explanation of directory's contents. (2) Index. (3) Gas utility and manufacturer company data codes. (4) Indexes of companies, individuals, products, and services. (5) Data covering companies. (6) Statistics on the New England gas industry. (7) Information regarding the NEGA. (8) Certain gas industry, governmental, travel, and hotel information.

THE MAKING, SHAPING, AND TREATING OF STEEL — This sixth edition of U. S. Steel Co.'s book covers scientific advances in the steel industry during the last 10 years. In addition to new information, descriptions of standard processes have been revised or rewritten to bring them up to date. A representative chapter is the one on heat treatment of steel, reporting work which reduces heat treatment to a science, with changes in steel structure predictable by comparatively simple diagrams. Price: $5 for schools and colleges, $7.50 for others. Order from the treasurer, U. S. Steel Co., 525 William Penn Place, Pittsburgh 30.

STATISTICS OF NATURAL GAS COMPANIES, 1950—Published by the Federal Power Commission, Publications Section, Washington 25, D. C. This current edition reports 1950 operations and the status at the end of the year of the 135 natural gas companies filing annual reports with the commission. Detailed financial and operating information is included, as are comparative financial statements summarizing data of all companies for the years 1940-1950. Order number of the 1950 edition is FPC S-93, and the price is $3.75. A 20-page summary of the report is available at 20 cents per copy.

DOLLAR SAVINGS THROUGH STANDARDS—Published by American Standards Assn., 70 E. 45th St., New York 17. This 32-page book is based on the report, "Survey to Obtain Data to Show Savings Derived from the Use of Standards by American Industry," which was prepared for the ECA to encourage European manufacturers to adopt U. S. production methods. Specific savings and production benefits attributed to standardization are cited.

PUBLIC UTILITY ACCOUNTING—by J. Rhoads Foster and Bernard S. Rodey Jr. Published by Parker Publishing Co., 5th Ave. at 13th St., New York 11. Claimed to be the first comprehensive publication for all public utility work, this volume includes special methods, procedures, and terminology used only in this field.

PEWTHERS' "EARTHRIPPER"

OPENS THE EARTH LIKE A ZIPPER!

ECONOMICAL... Pewther's EARTHRIPPER saves money three ways! It costs less —it's speedy operation saves labor costs . . . and standardization of automotive parts cuts down maintenance costs. Construction engineers who use the Pewthers' EARTHRIPPER have found that it costs only 4c a foot to operate. This low cost covers initial investment, depreciation, operation, maintenance, and labor over a three-year period! With an EARTHRIPPER, one man can handle your ditching problems, from driving the machine to the ditch site to lowering the boom and opening the earth at a maximum rate of twenty feet a minute! Because all gears run in oil, the EARTHRIPPER can be used for years with few replacements of parts. If you want to save time and money, invest in an EARTHRIPPER today.

MOBILE... The EARTHRIPPER is versatile because it is mobile. On the highway its speed is the speed of the truck. The raised boom clears telephone wires and tree branches, making transit easy and speedy, even in heavy city traffic. The EARTHRIPPER digs vertical ditches in any kind of terrain under almost any digging conditions. On slopes the frame levels. While the tires follow the contour of the earth, the ditcher digs a vertical ditch! If you need a ditcher for large or small ditching jobs, the EARTHRIPPER can solve your problems.

EFFICIENT... For straight, clean ditching, the answer is Pewther's EARTHRIPPER. This new, unique ditcher offers a complete different design. It is the first ditcher to be built into a truck. Bucket design saves time because there is no loss of time in cleaning. Bottom of each bucket forms the top of the preceding one. The buckets separate as they go over the top sprocket, throwing the dirt onto the conveyor belt. Conveyor belts throw the dirt on either side of the ditch and can be reversed on a moment's notice. In competition the EARTHRIPPER digs straight ditches with clean sides . . . in record time.

Pewther's "EARTHRIPPER" is the only ditcher built into a truck. This means *one man* can handle your ditching job, from driving the machine to the ditch site to opening the earth to a maximum depth of five feet. The EARTHRIPPER is particularly suited for gas lines, extensions and house-to-street service lines. Utility ditching requiring ditches 10", 14", or 18" wide are duck soup to this new, *different* Pewthers' ditcher.

Send for the folder on the new Pewther's ditcher, the EARTHRIPPER. Learn for yourself how the EARTHRIPPER can save time and money on any small ditching job! Ask for a demonstration before purchase . . . at any point in the United States!

I want the new folder on the Pewther's "EARTHRIPPER."

NAME_____ TITLE_____

COMPANY_____

ADDRESS_____

I saw this ad in the above magazine.

PEWTHERS DITCHER COMPANY

2323 CLAIBORNE AVE. • SHREVEPORT, LOUISIANA

ASSOCIATIONS

ROCKY MOUNTAIN GAS ASSN. officers recently elected for 1952 include S. J. Neely (standing), North Denver Furniture Co., director; (left to right) Ferrell von Trotha, Denver Fire Clay Co., director; William Van Genderen, Van Genderen Heating Co., and D. E. Warner, The Warner Co. Inc., vice presidents; D. A. Bell, Bell Plumbing & Heating Co., president; G. M. Musick, architect, director; and Roy G. Munroe, Public Service Co. of Colorado, secretary-treasurer.

NEGA Directory Praised As Defense Program Aid

The important role that comprehensive gas company directories can play in mutual defense programs was underscored by Gordon G. Howie, president of the New England Gas Assn. in a feature address before an NEGA operating division meeting in Boston Jan. 16.

Mr. Howie praised the new NEGA directory for its compresensive coverage of all possible sources of outside aid — home phone numbers and company numbers of executives of other gas companies, as well as complete data on suppliers.

Speaking on the subject of "Cooperation Among Gas Companies," Mr. Howie said:

"The directory should be listed as a contribution of the New England gas industry to preparations for civil defense, and it should be brought to the attention of local civilian defense directors."

Mr. Howie also detailed the experiences of Cambridge Gas Light Co., of which he is vice president, in rectifying troubles in a relief gas holder last December. He gave a large share of credit to other companies for their assistance in the operation.

A major portion of the meeting's discussion centered on conversion to natural gas, which remains the No. 1 topic among New England gasmen. Two round-tables were held on the subject. Those in attendance were also treated to a talk on odorization by A. B. Lauderbaugh, chief engineer, Manufacturers Light & Heat Co., Pittsburgh, and an intensive study of the new Koppers-Hasche process by G. V. McGurl of Koppers Co., Pittsburgh.

Gasco Mishap Rate 2.6

AGA's accident prevention committee has compiled figures showing that gas companies operating motor vehicle fleets experienced an average of 2.6 accidents for each 100,000 miles of travel during the nine months ended Oct. 31, 1951.

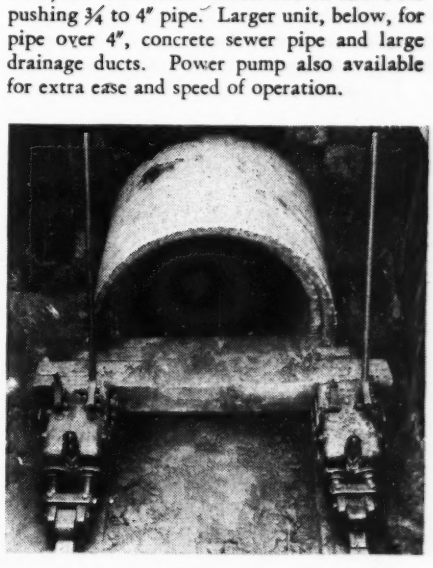
PANEL GROUP and speakers at New England Gas Assn. sales managers conference held Dec. 13 in Boston were (front row, from left): Gordon G. Howie, Cambridge; J. J. Quinn, Boston; Joseph K. Rainey, New Bedford; Roy E. Wright, Cambridge; (back row) Alvin Zises, Boston; Frank H. Trembly Jr., Philadelphia; Langley C. Keyes, Boston; and Henry A. Kievenaar, Boston. Theme of the meeting was mass market merchandising.

SAVE HOURS,

CUT COSTS ON YOUR

PIPING JOBS

PUSH PIPE UNDER STREETS, TRACKS, walks, floors and other obstacles with a GREENLEE Hydraulic Pipe Pusher. One-man-operated, portable, simple to operate. No tearing up of pavement . . . eliminates extensive ditching, tunneling, back-filling, tamping, repaving. Cuts job time to a fraction. GREENLEE Hydraulic Pipe Pusher often pays for itself on first job. Two sizes—model shown above for pushing ¾ to 4" pipe. Larger unit, below, for pipe over 4", concrete sewer pipe and large drainage ducts. Power pump also available for extra ease and speed of operation.



TOOLS FOR CRAFTSMEN

GREENLEE

Write today for descriptive literature. Greenlee Tool Co., 1942 Columbia Ave., Rockford, Illinois, U.S.A.

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MADISON, WISCONSIN
MIDLAND, TEXAS
MOBILE, ALABAMA
MT. VERNON, ILLINOIS
NEW YORK, NEW YORK
OMAHA, NEBRASKA

More than 12,500 vehicles were covered in the summary, taken from monthly reports of a representative number of companies. A total of 2726 accidents occurred during 104,611,100 miles of operation.

The reports showed that 23% of the accidents happened while trucks were standing or parked, 18% while they were moving straight forward, and 16% at intersections.

AGA Sets Up Three New Industry Committees

Recent events which have focused interest on safety and customer service responsibility have prompted the American Gas Assn. to set up two new committees.

Under authorization of the executive board, a committee on customer service responsibility, with Howard B. Noyes of Washington (D. C.) Gas Light Co. as chairman, has been formed to review policies pertaining to the servicing of gas appliances and to define specific responsibilities of the manufacturer, distributor, dealer, and gas company. The group will cooperate with a parallel GAMA committee.

Charles E. Bennett, president of Manufacturers Light & Heat Co., Pittsburgh, is chairman of the new executive safety committee, appointed to advise the industry on national accident prevention policies and to direct top management attention to the safety performance of individual employees. The committee recently met with the AGA accident prevention committee and will continue to work with that group.

To review the association's PAR plan, a new general committee has also been appointed to evaluate the plan to date and make recommendations to the executive board. A similar review was made in 1947. R. J. Rutherford, Worcester (Mass.) Gas Light Co. president, is chairman of the committee.

Association Newsnotes

J. E. Kern, assistant manager of the Pacific Coast Gas Assn., has set up a clearing house for PCGA members who wish to subcontract defense work or discuss such work with other manufacturers. Members of the association's manufacturers section were informed of plans for a Cooperative War Contract Procurement Program in December, and the response has indicated a good deal of interest, Mr. Kern reports.

H. H. Pigott of Equitable Gas Co., Pittsburgh, was elected 1952 president of the Pennsylvania Natural Gas Men's Assn. at the group's annual business meeting held Jan. 10 in the William Penn hotel, Pittsburgh. Other officers are R. L. Ehrman, Butler, Pa., vice president; P. L. Kesel, Pittsburgh, secretary-treasurer; and Mark Shields, Pittsburgh, who continues as executive secretary.

West Texas plant operators will hear a discussion on sulfur extraction when the Natural Gasoline Assn. of America holds its Permian Basin regional meeting Feb. 29 at the Lincoln hotel in Odessa. W. L. Phillips of Phillips Petroleum Co., Odessa, is chairman of the program committee.

PEOPLE

Changes in the gas operating department of Public Service Electric & Gas Co., Newark, include the following: ELWOOD R. VOLPE to assistant works superintendent, Central gas works; WILLIAM C. DIEDERICH to works superintendent at West End; C. D. JAMES to assistant to superintendent of industrial relations, general office; L. B. EDENFIELD to works superintendent, Paterson; C. E. LEECH to assistant planning engineer, general office; W. A. PEAK to general sales agent, Camden; ILDO PASQUALINE to chief plant chemist, Camden; J. B. DIERIENZO to chief works chemist, Harrison; R. J. SELBACH to assistant superintendent of distribution, Burlington district; F. A. THOENE JR. to engineer, Summit district; and D. F. CUNARDI, to assistant chief works chemist, Harrison.

New sales manager in the engineering and construction division of Koppers Co. Inc., Pittsburgh, is JOHN A. HARTZELL, former assistant sales manager. He succeeds WARD L. GABLE, who has retired but will continue as a special sales consultant. In addition, Koppers appointed C. W. MOHME as assistant to the production manager, C. K. WAIBEL as a sales engineer, and C. E. MIELKE and H. A. GROSICK as contract engineeers.

Three district sales managers have been added to the field organization of Timken Silent Automatic Division, Timken-Detroit Axle Co., Detroit, Mich. OLAF G. BEESTRUM JR. will cover Iowa; HILMER J. HASENOHRL, who has been in the Army for the past year, will handle southern Illinois, Missouri, and Kansas; and WESLEY C. ROBINSON will serve dealerships in part of Ontario.

Minneapolis (Minn.) Gas Co. has announced the appointment of MILDRED ENDNER to replace ISABEL MCGOVERN as home service director. Since 1943 Miss Endner has been supervisor of home calls for the company. She will direct a staff of 10 home economists. Miss McGovern resigned to specialize in television work for an eastern firm.

Equitable Gas Co., Pittsburgh, has announced the appointment of WILLIAM H. BOUNDS as assistant superintendent of the gas measurement, planning, and development department. Mr. Bounds joined the firm's geological division in 1935, has since served as clerk, chief clerk, and measurement engineer in the gas measurement division.

CONRAD C. MOUNT, Oklahoma City attorney, has been elected a member of Consolidated Gas Utilities Corp.'s board of directors. He is vice president and general counsel of the company and has been connected with it as an attorney for the past 20 years. He will retain his other positions with the utility.

New assistant chief mechanical engineer of American Car & Foundry Co., New York, is NORMAN E. CARLSON. For the past eight years, Mr. Carlson has been associated with the Great Northern Railway. He will headquarter in New York.

Simultaneous promotions at Milwaukee (Wis.) Gas Light Co. include the appointments of JOHN A. CALLAHAN as personnel manager and NORMAN J. HUNDT, with 17 years' experience in the field of education, to the newly created post of training director in the personnel department. Mr. Callahan, formerly associated with the Federal Telephone & Radio Corp. as a legal advisor, also served as assistant to the vice president of industrial relations at the Philadelphia Transportation Co.

NORRIS HICKS has been named assistant treasurer of Arkansas Natural Gas Corp., Shreveport, and its subsidiaries, and PATRICK H. BARRY has been appointed cashier of the treasury department. Mr. Hicks, who was treasury department cashier at the time of his appointment, replaced J. WARREN FULTON, who resigned.

Appointment of IRVING K. PECK as vice president of Columbia Gas System Service Corp. was announced recently by Stuart M. Crocker, chairman. Mr. Peck, who has been vice president and general manager of the Pittsburgh Group companies of the Columbia system since 1946, will have the responsibility of procuring natural gas from the Southwest. After a survey trip, he will probably establish headquarters in Dallas.

Irving K. Peck
Columbia Gas

H. C. Webb
Okla. Natural

H. C. WEBB, general sales manager for Oklahoma Natural Gas Co., Tulsa, was elected vice president at a recent meeting of the board of directors. Since beginning his public utility career with the street railway system in Houston in 1918, Mr. Webb has had 35 years of experience in El Paso, Baton Rouge and Lake Charles, La., Virginia and Seattle, Wash.

A number of promotions which became effective the first of the year have been announced by H. R. Basford Co., San Francisco. WILLARD H. MIXTER moved from vice president and assistant general manager to vice president and general manager; J. T. TEMPLETON, vice president and director of sales, to vice president and assistant to the president; GEORGE DICKIE, electrical department supervisor, to general sales manager; and MAUREY CARLEY, Zenith representative, to replace Mr. Dickie.

White-Rodgers Electric Co., St. Louis, has named RICHARD H. EWERT as general manager, office sales division. Mr. Ewert was once assistant sales manager and mechanical engineer for Illinois Gear & Machine Co., Chicago. More recently, he served as staff engineer for Barco Manufacturing Co., Chicago.

Wrong !
ADJUSTMENT
¶ Just when you're taking a nice warm shower, someone decides to water the lawn or fill the laundry tubs—then your hot and cold water adjustment is upset because of pressure change!
¶ The same principle applies to Gas Pressures—changes in pressure will affect the proper mixing of gas and air necessary for optimum operation of gas burning units.
¶ Maxitrol Gas Regulators automatically adjust and control Gas Pressures 24 hours a day—every day!
¶ If you have problems in Pressure Regulation please call on our Engineering Department to help you.
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W. B. Hewson

Robb Quinby

G. C. Griswold

J. J. Deely

Brooklyn (N.Y.) Union Gas Co. has promoted WILLIAM B. HEWSON, assistant vice president since 1948, to vice president and has elected three assistant vice presidents: JAMES J. DEELY, new business department manager; GORDON C. GRISWOLD, economic research department manager; and ROBB QUINBY, rate department manager.

In addition, HENRY A. DIEKMANN, assistant manager, new business department, has been advanced to manager, and MARTIN GIBBONS, former district sales manager at the firm's Bedford branch, has replaced Jim Howley, retired, as manager of dealer relations.

Mr. Hewson started as a cadet engineer in 1933. He was named publicity and advertising manager in 1945 and became an assistant vice president in 1948. Mr. Deely began his company career in 1930 as a salesman in the househeating division. He then rose to division supervisor, retail sales supervisor, domestic sales manager and, in 1945, new business department manager.

Mr. Griswold, who joined Brooklyn Union in 1933, went into the rate bureau in 1939 as Mr. Quinby's assistant and in the following year became an assistant statistician. In 1946 he was chosen to head the economic research department. He is one of 12 industry experts named by PAD to assist in forecasting gas supply and requirements. In 1931 Mr. Quinby joined the firm as a utilization assistant and was promoted to statistician in 1938. The next year he was assigned to the accounting department to head the newly organized rate bureau and, in 1946 when the bureau became a department, he was appointed its manager.

A vacancy created early in 1951 when L. A. CASLER, executive vice president of Eureka Williams Corp., Bloomington, Ill., was placed in charge of defense work and overall production, has been filled by C. S. STACKPOLE, who was appointed vice president in charge of the Oil-O-Matic division. Mr. Stackpole was vice president and general sales manager of Chrysler Corp.'s Airtemp division and, formerly, he was associated with Consolidated Gas Electric Light & Power Co. of Baltimore for 20 years.

New director of information for Manufacturers Light & Heat Co., Pittsburgh, is J. N. BETZ, former assistant sales manager in charge of industrial sales. Mr. Betz, previously district sales supervisor for the associated companies of Keystone Gas Co. and Cumberland & Allegheny Gas Co., will turn over his former position to JAMES G. MCKEE, an industrial engineer at the latter company for the past year. Mr. McKee will headquarter at Manufacturers' general offices.

New vice presidents of Rheem Manufacturing Co., New York, are ROBERT P. WILLIAMS JR. and CLARENCE GRAHAM SR. Mr. Williams is the firm's Washington manager and Mr. Graham was president of James Graham Manufacturing Co., Newark, Calif., now being operated by Rheem as the Wedgewood division.

CHARLES F. MONNIER has succeeded the late DAVID J. BROWN as operating superintendent of Niagara Mohawk Power Corp.'s (Syracuse, N.Y.) eastern division. He has been with the utility since 1927 when he entered the operating department in Schenectady.

R. J. LAFFERTY has been appointed San Francisco area resident representative for Handy & Harman, New York. Mr. Lafferty, who has been in the firm's Los Angeles office, will headquarter in Oakland, Calif.

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COMPANY_____

NAME_____ POSITION_____

STREET CITY ZONE STATE

Appointment of JAMES N. CRAWFORD as assistant to President Lyle C. Harvey of Affiliated Gas Equipment Inc. was announced last month. During the past seven years Mr. Crawford served as director of sales for Bryant Heater, Cleveland, one of AGE's three

J. N. Crawford

W. H. Wise

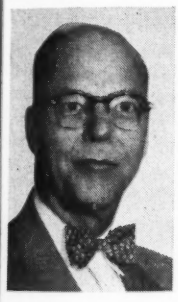
operating divisions. W. H. WISE, assistant director of sales for the past year and previously Bryant's midwestern sales manager, has succeeded Mr. Crawford.

New Minneapolis district sales manager for Servel refrigerators and water heaters is JAMES W. SLOWE. For the past two years he has been dealer representative for the Detroit sales branch, and previously he represented Servel in Cincinnati, Washington, and Pittsburgh. He succeeded B. P. COLLINS, who was transferred from Minneapolis to Columbus, Ohio.

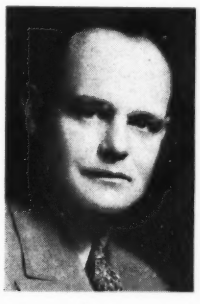
LORNE J. PRICE has been appointed Southern Dominion division superintendent for Dominion Natural Gas Co. Ltd., Buffalo, N. Y. He joined the company as a cadet engineer in 1932 and, most recently, was assistant division superintendent.

A. W. CONOVER, president of Equitable Gas Co., Pittsburgh, was recently elected to a three-year term as a member of the board of directors, Pittsburgh Chamber of Commerce.

C. W. BONDURANT has been appointed sales manager of Titan Valve & Manufacturing Co., Cleveland, Ohio. Mr. Bondurant, who has been with the company for many years, was chief development engineer for 12 years prior to his appointment.



C. W. Bondurant
Titan Valve



C. P. deJonge
San Diego

C. P. DEJONGE has been appointed general superintendent of San Diego (Calif.) Gas & Electric Co. succeeding H. A. NOBLE, who recently became vice president in charge of operation. Mr. deJonge will direct the following departments: electric production, transmission, and distribution, gas, transportation and shops, and buildings and grounds. He joined the company in 1930 as a gas department inspector.

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Independent Natural Gas Co., Bartlesville, Okla., a former subsidiary of Phillips Petroleum Co., recently was purchased by E. L. GREEN JR., vice president of Cabot Carbon Co.'s (Pampa, Texas) operations in the Southwest, and HUGH BURDETTE, Cabot vice president. At a special meeting of the board of directors, Mr. Green was elected president of Independent Natural.

C. T. CHENERY has retired as board chairman of Scranton-Spring Brook Water Service Co., Sranton, Pa., and will be succeeded by RULISON EVANS, president. Mr. Chenery plans to continue as senior officer of Southern Natural Gas Co. and Southern Production Inc.

Obituaries

PAUL L. R. WHITE, commercial sales representative for Southern Counties Gas Co., Los Angeles, died of a heart condition on Dec. 16. Except for Army service from 1942 to 1946, he had been with the company since 1939. Mr. White was 37.

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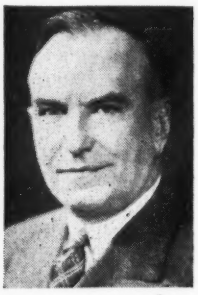
Union Carbide & Carbon Corp., New York, lost two executives in late December. JAMES A. RAFFERTY, vice president and director, died Dec. 1[9] in Fort Lauderdale, Fla. and DR. ARTHUR B. RAY, special products division sales manager for Carbide & Carbon Chemicals Co., died Dec. 24 at Port Washington, N. Y.



J. A. Rafferty

Mr. Rafferty was a pioneer in the development of synthetic organic chemical industry in the U. S., and he played a key role in the development of atomic energy. Mr. Rafferty joined Union Carbide in 1920 after serving with Peoples Gas Light & Coke Co., Chicago, and Linde Air Products Co., New York. In 1929 he was made president of Carbide & Carbon Chemicals Corp. and in 1939 was elected president of Bakelite Corp. He became chairman of the board of both concerns in 1944. In 1948, Mr. Rafferty received the Chemical Industry Medal from the Society of Chemical Industry.

Dr. Ray, considered the country's foremost authority on activated carbon, joined Union Carbide in 1919. In addition to his pioneering work in this field, he was also an authority in the fields of inorganic, physical, and industrial chemistry; rare earths; toxic inorganic materials; reactions between gases; and incendiary and pyrotechnic materials.

A pioneer gas water heater executive, ALFRED P. BRILL, died Dec. 11 in Pittsburgh at the age of 70. Mr. Brill joined Ruud Manufacturing Co., Pittsburgh, in 1902 and successively held the offices of secretary and treasurer, vice president, president, and board chairman. He retired in 1945.

On Jan. 4, M. WILSON ARTHUR, 61, vice president and director of Consumers Power Co., died in Jackson, Mich. A long-time leader in public utility activities, Mr. Arthur joined Consumers Power as vice president and assistant general manager in 1933 and was elected a director in 1949.

GEORGE A. DETRICK, treasurer of Southern California Gas Co., Los Angeles, until early 1945, died on Dec. 23. He had joined the company in 1922 and worked in various capacities in the auditing department, Central division.

WALTER WEHNER, 47-year-old application selling department manager of American Radiator & Standard Sanitary Corp., Pittsburgh, died Dec. 19 in Newark. Mr. Wehner joined American-Standard in 1[9]

In late December, JAY D. SOWASH, assistant superintendent of Laclede Gas Co., St. Louis, died of a heart ailment at the age of 70. He had been connected with Laclede for 48 years.

JOHN D. HOWLAND, former supervisor of Brooklyn (N. Y.) Union Gas Co.'s accounting department for 51 years, died on Dec. 25 after a brief illness. He was 74 years o[ld]

GAS

PIPELINE NEWS AND FEATURES

First Line From Alberta Ready

But it sits idle, awaiting U. S. approval

LATE last month, the Montana Power Co. of Butte sat figuratively with its hand on the valve wheel of an international gas pipeline, awaiting word expected momentarily from Washington which would permit it to start the first large-scale importation of natural gas fram Alberta, Can.

Under terms of the Alberta government's permit, Montana Power may take out 43.8 billion cu ft during the next year to serve defense mining and smelting operations in the state. The Alberta gas, in volumes up to 10 billion per year, must be used exclusively for operations of the Anaconda Copper Mining Co., giant producer of copper, zinc, manganese, and other strategic metals critically needed in this country's defense production.

As of late January, everyone except the administration had made up his mind that the line is vital to defense. It was sitting idle, all ready to take gas after completion of laying operations in early December. But first, FPC had to issue a limited import certificate and the President had to grant a permit before any gas could flow.

The Alberta and Canadian governments, at the urging of some U. S. defense official, granted limited export permits last summer.

Technically, Montana Power's gas would not be the first to be exported to this country from Alberta. As far back as June 1950, Gordon M. Plotke of Calgary was granted a permit to export Alberta gas to Montana—a distance of 300 ft from his well north of the border to his camp buildings on the Montana side. He has been doing it for 15 years, and the 1950 order merely put the province's official stamp on his operations.

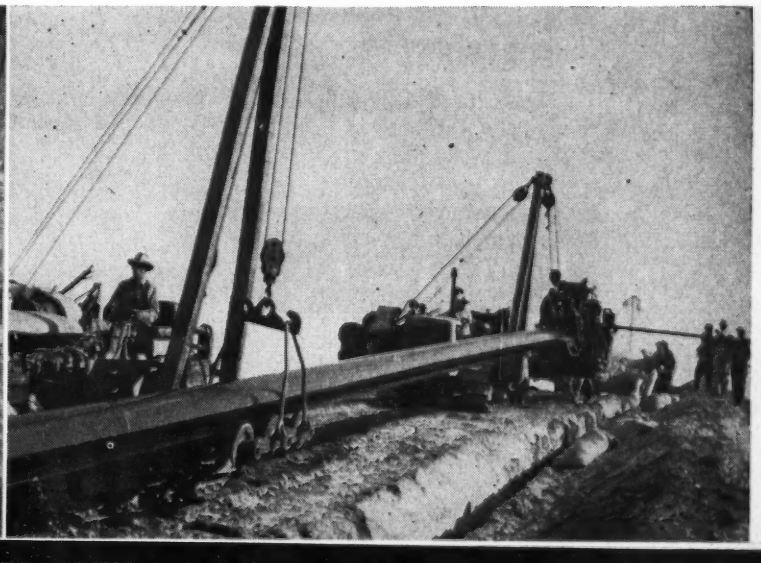
Approval of Montana Power's applications climaxed months of negotiations.

In the summer of 1950, Montana Power reached an agreement with the McColl-Frontenac and Union Oil companies for the purchase of some 400 billion cu ft of natural gas reserves in the Pakowki Lake area of southeastern Alberta—an area developed by the two oil companies.

The producing area's headquarters, Camp Pendant d'Oreille, are located about 110 miles southeast of Lethbridge, Alberta. There are eight wells in the Pendant d'Oreille field; two in the Smith

While most of the line crosses vast wheat and grassland country, crews had some mountains to cross, such as in the rugged Bear Gulch area five miles north of the border.

Work began in July, was completed in December, and while for much of the time crews encountered good weather, as is evident here, winter snow made later stages difficult.



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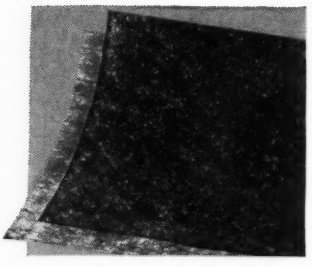

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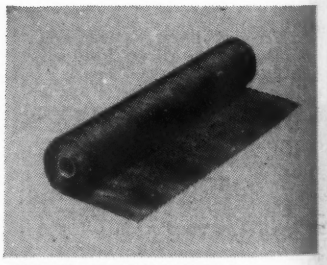

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First Line From Alberta Ready

(Continued from p. 101.)

Coulee field, 11 miles west of the headquarters camp, and three in the Black Butte field, 12 miles south of the camp. The latter field is farther from headquarters than mere mileage indicates—40 miles by dirt road.

No compression is necessary to move the gas which has a pressure of about 650 psi before regulation. At present it will be set in the line at about 525 lbs.

The transmission line—on both sides of the border—traverses boundless stretches of grass and wheat land, with a fair measure of rugged gulches and mountainous terrain thrown in. One river crossing on the Milk river in Alberta was negotiated, requiring an 820-ft link.

Weather plagued the construction job almost from start to finish, but despite that, no serious difficulties were encountered. Alberta recorded more precipitation last summer and fall than it had since weather records were started in 1902. During the summer, construction crews were drenched by rain and during the fall and early winter, snow and wind made things unpleasant. On the American side, miles of ditch were blown full of snow and had to be reopened before pipe could be laid.

On Aug. 18, 1950, McColl-Frontenac and Union filed applications with the Alberta government seeking export permits, but five other companies were before the government for similar permits and the Alberta officials, following hearings, held the matter of export in abeyance pending determination of the province's reserves. Subsequent hearings continued throughout 1951.

Nearly a year ago—on March 2, 1951—Alberta's Minister of Mines Tanner introduced a bill in the provincial legislature to allow limited export of natural gas to Montana to serve the A.C.M. company's defense operations. The bill had the backing of U. S. Defense Mobilizer Charles E. Wilson and Canada's Minister of Defense Clarence D. Howe.

The Alberta legislature rushed the measure through, and a limited export license was granted on June 18, 1951.

Two days later, Montana Power Co. applied to the Federal Power Commission for the necessary import authorizations, but quick action on this side of the border was snagged when protests were entered by coal and railroad groups.

They organized the "Western States Fuel Policy Council" and entered formal protests before the FPC on behalf of the National Coal Assn., Montana Coal Operators Assn., United Mine Workers, and Railway Labor Executives Assn.

Extensive hearings were held in two Montana cities from Sept. 10 to Oct. 3 before FPC Examiner Farrington.

Montana Power, using its own engineers and officials as well as officials of the A.C.M. company, based its case on the fact that the gas was needed for critical defense production in A.C.M. plants that had been using natural gas for 20 years or more and that declining reserves in Montana, available to Montana Power, were insufficient to carry the industrial and residential loads.

The protestants argued that the gas was not needed in A.C.M.'s operations and that the granting of an import permit would be the "opening wedge" which would allow Canadian natural gas to compete with domestic coal from one end of the United States to the other. Declining markets for Montana coal also were cited by the Montana operators and UMW.

Oral arguments were held before the Federal Power Commission on Dec. 7, and Montana Power officials sat back to await the government's action on its application.

Introduction of the Alberta gas, when it comes, will be welcomed by Montana Power officials, who experienced serious problems in December due to severe cold weather. During the last month of 1951, large industrial users were curtailed on three occasions to assure full service to residential customers. Brief but serious curtailments occurred on Dec. 8, 19, and 31.

The 71.4-mile pipeline connecting Alberta's Pakowki Lake area with Montana Power's system at Cut Bank, Mont., was started during the latter part of July and was completed early in December. Cold weather and drifting snow hampered construction work in the late stages.

The international pipeline is in two sections. North of the border, 18.4 miles of 16-in. line are in the ground from Camp Pendant d'Oreille, headquarters of the Pakowki Lake operations, to the Montana line 1½ miles west of the port-of-entry station at Aden, Alta. That section is owned by the Canadian-Montana Pipeline Co., a wholly-owned subsidiary of Montana Power.

The southern section, owned by Montana Power, includes 53 miles of 16-in. line from the border to the Cut Bank compressor plant of the company.

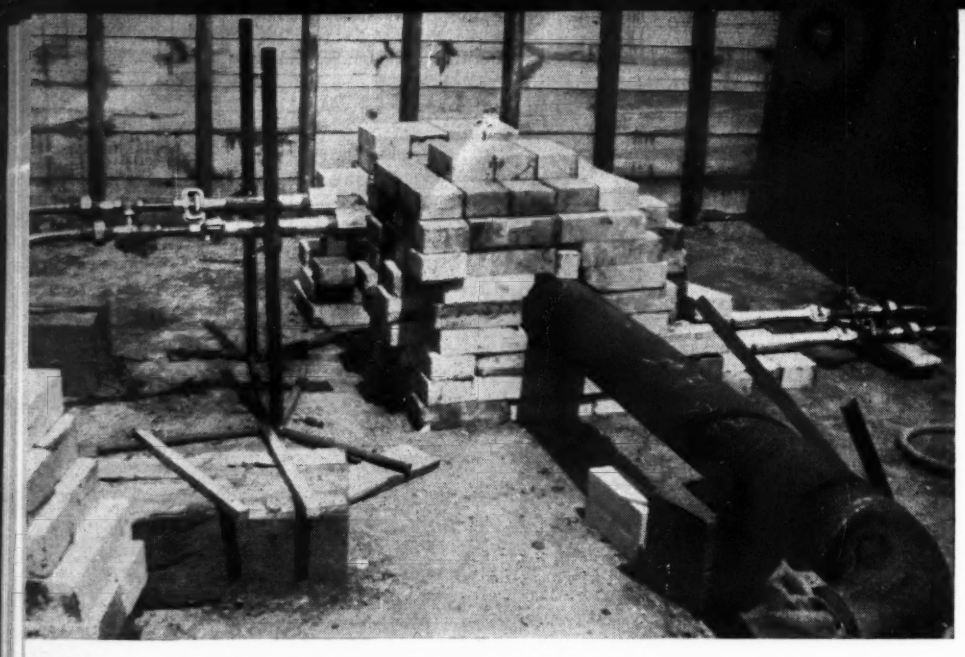
By the time this issue is in the mails, the requisite permits might have been granted. Late in January, however, official Washington was remaining mum. At that time, Larston Farrar, Washington editor of *GAS*, wrote:

At presstime, no action had been taken either by the President or FPC on the application of Montana Power Co. to import gas from Alberta, and to sell it to the Anaconda Copper Mining Co., a vital defense plant in every sense of the term.

The shadow-boxing and undercover grappling over this issue is hardly to the credit of either the administration or to the coal interests, which seem determined to make an issue of any point in their competitive battles with gas in the executive and legislative branches of the government.

The decision of the FPC was already past due when GAS went to press. Commissioner Harrington Wimberly told me it would be given to the press sometime before Feb. 1. How the FPC would decide, and whether or not President Truman would grant the presidential permit necessary to import the gas, were not a matter of record.

It was felt in some circles, however, that neither the President nor the FPC could turn down Montana Power Co.'s application after the matter had gone as far as it has. The emergency agencies—DPA, NPA and PAD—all were more or less urgent in requesting that the FPC okay the project and that the President sign the permit. Unless President Truman has become completely immune to the logic of a given situation and unless the FPC members are unaware of the national emergency which President Truman declared personally more than a year ago, it seemed inevitable that the project would be okayed, barring overriding reasons that not yet are apparent to the naked eye.



Brick furnace is constructed around finished weld on high pressure line at Snyder repressuring station. Two-hour firing period accomplishes stress relieving in accordance with code.

Stress Relieving Welds on Pipelines With Brick Ovens

A NEW method of relieving the stress of arc welds on high pressure line pipe recently was used by Lone Star Gas Co., Dallas, at its Snyder, Texas repressuring station.

The procedure, planned by A. B. Hemphill of the transmission division engineering department, included the use of commercial natural gas burners in brick furnaces built around the welds. Pipe of extra thickness is required in plant areas where unusually high pressures are carried. At Snyder, some of the pipe was 6 in. in diameter and .864 in. thick. It was built to handle 3500 lbs of pressure for the injection well there.

During the arc welding process, stresses or strains are created because each pass or layer of weld on a joint is in a different stage of contraction from the intense heat of welding. Since there are eight passes or layers of weld put on each joint of this high pressure line pipe, contraction and cooling take place in stages as heat of the arc is applied by the welder to each succeeding pass. Relieving this stress by reheating the entire completed weld equalizes strain on the combined eight passes, thus strengthening the finished weld.

Relief of these stresses, by reheating of the weld and the pipe on either side of it to a high temperature and holding it for a specified length of time, is required for all carbon steels ¾-in. thick or thicker by the American Standard code for pressure piping. The code specifies a heat of 1100 to 1250° F.

Stress relieving is necessarily a field operation because it must be done after pipe has been welded into sections with fittings in place and before it is put into operation. The problem of such an operation outside a shop equipped for the work is temperature control.

The equipment assembled by Lone Star included four high pressure burners with flame retention tips, four 50-ft sections of ½-in. high pressure air hose, 450 fire brick, eight 14 by 16-in. steel plates ¼ in. thick, and 18 "Tempilstiks" for determining three different temperatures. These are crayon-like indicators that will melt when applied to metal heated to certain degrees.

There were 130 welds in the high pressure piping for the station. Construction of a brick furnace around the line at each weld was the first step in the work. Each furnace was equipped with two burners, one placed on each side at different levels. Two steel plates were installed in the furnace to direct the fire around the pipe, rather than directly on any one spot. Two furnaces were kept in operation simultaneously.

Each burner was equipped with an .052-in. orifice. Natural gas at 20 psi was piped into the burners from a common header; each burner consumed approximately 75 cu ft of gas per hour.

The ends of the pipe were closed to prevent the circulation of air inside them during the firing. The furnaces were protected by a canvas wind break, which aided control of temperatures during the heating and cooling processes.

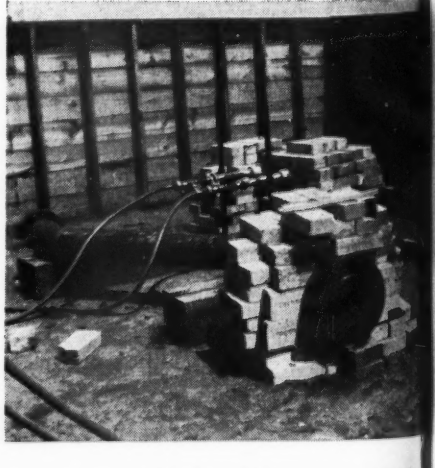
The burners were fired and left in operation until the pipe reached a temperature of 1150°. A "window" was left in the furnace for testing with the Tempilstiks. It usually took about an hour for the initial heating. Then the flame was regulated to hold a temperature between 1100° and 1250° for an hour, conforming to the code.

When the burners were turned off, the top bricks of the furnace were removed and it was filled with loose mineral wool insulation completely surrounding the pipe and weld. The bricks were replaced and the furnace and pipe allowed to cool slowly.

In some cases the pipe temperatures were 600° two hours after the burners were removed and the furnaces packed.

Other methods of stress relieving welds have been used by Lone Star in the past. One employed a kerosene torch with an air compressor and another used non-commercial natural gas burners. At Snyder, the temperature control was more exact, the results met code requirements as nearly as practical under field conditions, and time and cost were reduced.

These photographs show four burners on each furnace, two on each side. It was later found that one burner on each side of a furnace was sufficient. Pipe ends were sealed to prevent air circulation.



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Boom lowers catch joint into ditch in preparation for run. Slits cut in joint permit gas to blow to air at end of run. Upstream end in foreground.

Northern Natural Catches a Pig

NORTHERN Natural Gas Co. has a new catcher on its team. No longer do its pipeline crews have to shag flying pigs; the new "man" pockets them right in his mitt.

More properly, the device is known as a "catch joint," and it's fashioned from a length of pipe the same diameter as the main pipeline to be cleaned. Slits in its circumference permit the rushing gas to spend itself as the pig is brought to an abrupt stop at the end of its mile-a-minute trip through the line.

Less spectacular than the old method, whereby the pig was catapulted out of the pipe at the end of its run, crashing into (or sometimes missing) bales of straw set up as a backstop, the catch joint brings new efficiency and safety to the cleaning task.

The joint is attached with metal bands to the downstream end of the length of line being cleaned. When the run is completed, crews from the Omaha pipeline company disconnect the joint—with the pig inside—swing the section out of the trench, and lower in a special blow-joint used in connection with the operation of clearing the line of debris loosened by the pig.

Adapted from *Northern Natural News*.

Canvas wrapping protects slits in catch joint. When in place at end of section being cleared, joint is coupled with metal bands.

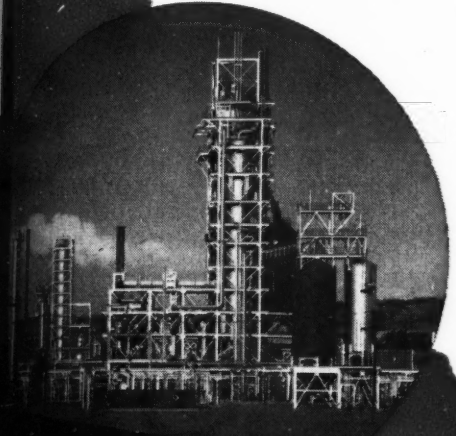
Crew members slip pig into place. About 5 ft long, the pig weighs 415 lb, costs $1800. Catch joint protects this investment as well as lives.

Gas roars from end of pipe. Small-diameter pipe was used to maneuver joint into place.

petroleum industry in these many ways

The steady growth of The Fluor Corporation goes hand-in-hand with that of the petroleum industry since the first *big* discovery of Texas oil at Spindletop. Fluor's engineering and construction personnel were engaged primarily in heavy industrial construction just prior to Spindletop. Soon after Spindletop, the company's engineering and construction skills found ready acceptance by the rapidly expanding petroleum industry.

First contracts called for the design and construction of gas compressor stations. Next came work in gasoline processing plants. Then followed the design, engineering and construction of major refining units. Today Fluor is recognized as one of the nation's major engineering and construction organizations. Whatever your plans might include—a completely integrated plant or the expansion of existing facilities—Fluor's accumulated experience in the petroleum refining, gas-gasoline and chemical processing industries is at your disposal.



atalytic cracking units

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ALLIED PLANTS AND FACILITIES

Fluor has designed, engineered and/or constructed plants and facilities for the processing and production of ammonium sulfate, sulfuric acid, liquid CO_2, toluene, and paraffin and crystalline waxes, as well as plants for the blending, compounding and packaging of lube oil and greases.

FLUOR LITERATURE AVAILABLE

Catalogs and bulletins—describing Fluor's engineering and construction activities for the petroleum industry, and Fluor specialized products—appear in current issues of Sweet's Catalog (Process Industries Section), Chemical Engineering Catalog, and Refinery Catalog—or request individual copies.

Fluor's manufactured products were first designed for the Petroleum Industry

COOLING TOWERS

Fluor Cooling Towers were the first "engineered" cooling towers to be installed at Signal Hill, California in 1921. They are now in service throughout the world in virtually every industry utilizing water as a cooling medium.

FIN-FAN COOLING UNITS

Fin-Fan Air-Cooled Heat Exchangers were pioneered by Fluor and The Griscom-Russell Company in 1941. It was the first air-cooled heat exchanger to answer industry's need for a compact, low-maintenance unit utilizing air as the cooling medium.

PULSATION DAMPENERS

In 1943, Fluor pioneered the development of a pulsation dampener to remove gas stream pulsation and subsequent vibration in compressor piping. Fluor continues its leadership in this field.

FLUOR MUFFLERS

The first Fluor Mufflers were placed in service in a gasoline plant in 1926. Now Fluor offers two basic types: A single-element muffler and a dual-element muffler. Each type solves specific muffling problems and both offer industry the highest muffling efficiency obtainable.

OTHER FLUOR PRODUCTS

In addition to the products outlined at left, Fluor has long been identified as manufacturers of Gas Cleaners and other special equipment related to the oil, gas, chemical and allied industries.

DESIGNERS AND CONSTRUCTORS of Refining, Natural Gas and Chemical Processing Plants.
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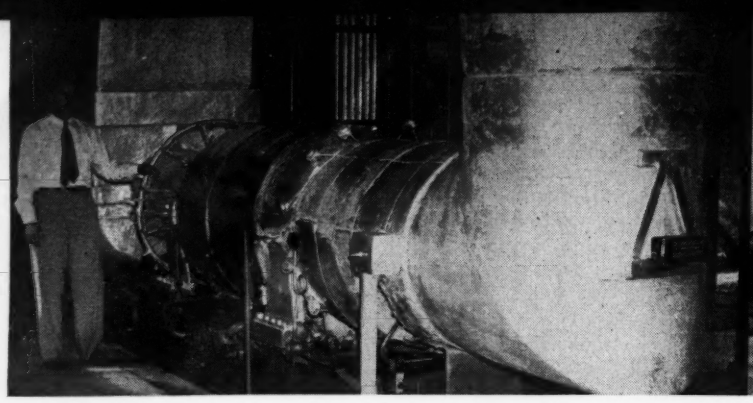
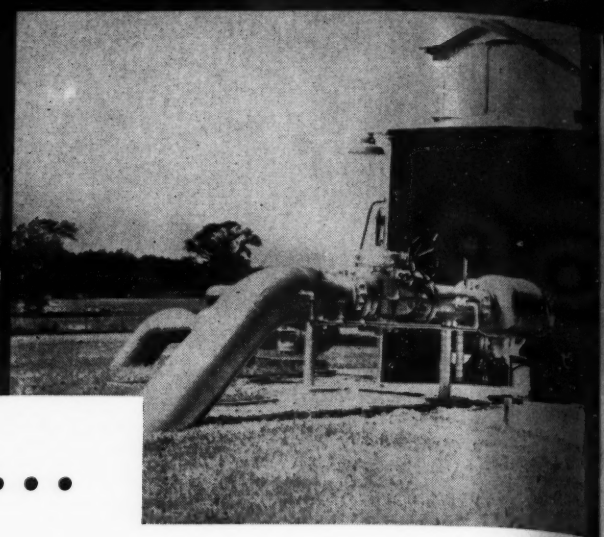




GAS TURBINES...

More Compression for Less Money

Fig. 1. Gas turbine unit (1800-hp) installed in pumping station.

Fig. 2. Closeup of incoming gas line and centrifugal gas compressor.

By T. J. PUTZ
Westinghouse Electric Corp.

IN the past, compressor horsepower requirements have been supplied largely by reciprocating type compressors driven by direct-connected reciprocating gas engines. Stations were spaced 75 to 100 miles apart, and gas was compressed to a pressure ratio between 1.5:1 and 2:1. These high compression ratios heated the gas to a point where it was economically necessary, in order to maintain line capacity, to cool the gas before returning it to the line.

By reducing station spacing, lower compression ratios are made possible and the need for gas cooling is eliminated. Horsepower required to pump a given amount of gas can be reduced 25 to 40% with closer station spacing. For handling large volumes of gas with low pressure ratios, the centrifugal compressor is ideal.

Use on the Inches

When the Big Inch and Little Inch lines were converted to gas carriers at the end of World War II, centrifugal compressors were developed to make use of the existing electric motor drives. The successful operation of these compressors has demonstrated their suitability to this type of service.

One serious drawback to the electric motor drive, however, is the cost of the electrical energy as compared with the energy cost of the gas in the pipeline. The gas turbine, which produces its power rating by using the fuel in the gas line, is an ideal drive for centrifugal pipeline compressors. It can be developed in units of large horsepower rating having relatively high rotative speeds and the speed load flexibility necessary to handle large pipeline flow variations.

Comparative studies have been made to determine the economic advantages of the gas turbine driven centrifugal compressor and conventional direct driven reciprocating gas engine units. One study was made using these drives to fully develop a theoretical transmission line 1000 miles in length. This study was based on the assumption that complete spare units would be available to maintain design flow capacity in the event of shutdown of one unit. The result showed that a 26-in. OD pipeline could be economically developed to the same delivery capacity with a gas turbine driven centrifugal compressor as a 30-in. OD line with reciprocating engines.

Optimum station spacing was found to be 40 miles using the gas turbine centrifugal compressor with a pressure ratio of 1.24. The optimum spacing for the conventional direct driven reciprocating gas engine unit was 80 miles with a pressure ratio of 1.54. The study showed that the lines could be economically developed for a capacity of 550 MMcf per day or 170 billion cu ft annually (85% load factor). The 26-in. line would require $8 million less capital investment, 64,500 tons less steel, and could be operated with a reduced transportation cost of approximately .8 cents per Mcf or a $1,360,000 reduced annual cost. This study was based on designing these theoretical lines in a manner to permit planned increases in capacity by the addition of main line compressor power until the ultimate economic operation was reached.

A second study showed that the addition of centrifugal compressors in the 30-in. line between reciprocating stations would economically increase the capacity of this line from 550 MMcf per day to 670 MMcf.

Suitable on Large Lines

As a result of these various studies, it was concluded that the gas turbine could be economically used to drive centrifugal compressors on gas lines 20 in. in diameter and larger. The simple single shaft gas turbine unit is ideal as a booster in locations where great flexibility is not required and its use is restricted to taking care of peak loads. Where more flexibility is needed to take care of large pipeline flow variations, the dual shaft gas turbine is required. With the addition of a regenerator, this unit becomes competitive on a fuel and lubricating oil cost basis. This second type unit was used in the comparative study made for the theoretical 1000-mile pipeline.

While a large number of gas turbine driven centrifugal compressor units have been reported sold, only one at the time of writing this article (September 1951) has been in actual operation in pipeline pumping. (See *GAS*, July 1951, p. 80.)

Westinghouse placed in service in May 1949 an 1800-hp gas turbine driving an Ingersoll-Rand direct connected centrifugal gas compressor in a test station on a natural gas line at Wilmar, Ark. This was the first such installation in the

Adapted from a paper presented at the annual meeting of the American Society of Mechanical Engineers in Atlantic City, Nov. 25-30.

orld and the first industrial gas turbine n the U. S. operating with natural gas uel.

This test installation was on the 22-in. e of Mississippi River Fuel Corp. con- cting Monroe, La. with St. Louis, Mo. was located approximately midway be- een two conventional engine driven ations at Crossett and Glendale. This ocation provided great flexibility in that it gave an opportunity to test the gas urbine and the centrifugal gas compres- sor over their entire operating ranges.

The unit was operated at the Wilmar location until the fall of 1950. At that ime, Mississippi River Fuel completed nstallation of a parallel high pressure ne, which eliminated need for the unit this location. It was then moved to rmington, Mo. approximately 60 miles ow St. Louis and placed in service in uary 1951. At this new location it is l to "pack" the underground storage l recently acquired by this gas com- y near St. Louis.

On Single Bedplate

The complete unit—turbine, combus- tors, compressor, and the direct con- nected centrifugal gas compressor—is mounted on a single bedplate. Mounted on the side of the bedplate are the con- trol valves, starting lubricating oil pump, fuel pump, and starting motor. The total unit weighs 26,000 lb and is 20 ft long.

Fig. 1 shows the unit installed in the pumping station. The gas compressor is beyond the fire wall at the far end of the power unit. *Fig. 2* shows a closeup of the incoming gas line and the Ingersoll-Rand centrifugal gas compressor. It com- presses 190 MMcf of gas from 337 to 400 lb pressure.

Fig. 3 shows the turbine rotor of this unit after 5000 hours of pipeline opera- tion. Thirty-five hundred hours of this total was with natural gas fuel, the re- mainder with distillate fuel oil.

In evaluating the gas turbine booster unit, the following advantages have been realized over conventional reciprocating engine compressors:

1. Only a light foundation is required.
2. Station housing may be small.
3. Few auxiliaries are required.
4. Auxiliary power consumption is low.
5. Lubricating oil consumption is low.
6. No water is required.
7. Piping to and from station can be simple.
8. No gas line pressure pulsations are en- countered.
9. Automatic operation is possible.

The experience gained from this in-

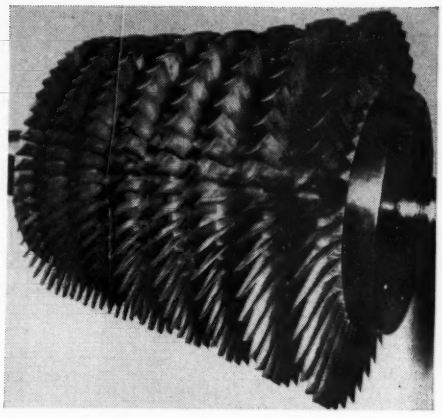


Fig. 3. Gas turbine rotor (1800-hp) after 5000 hours of pipeline operation.

stallation has proved that this type of gas turbine is ideal for booster service. The simplicity and small size allow for a simple, low-cost station, and it can read- ily be moved to various locations. It can be shut down for extended periods with- out the expense of providing special protection and can be later restarted in an exceedingly short period of time without difficulty.

Based on the operating experience gained with the 1800-hp simple single shaft unit in pipeline pumping service and the results of detailed studies of main transmission line pumping require- ments, we have designed and are build- ing a 5000-hp dual shaft gas turbine with regenerator. *Fig. 4* shows a longitudinal cross section of this unit. The unit will have an 11-stage axial flow compressor, six combustors, two-stage compressor drive turbine, and a single stage power turbine.

With this arrangement the power tur- bine and gas compressor speed and load can be adjusted to suit varying pipeline flow conditions. The speed of the com- pressor and the compressor drive turbine is 6200 rpm while that of the drive tur- bine is 6500 rpm at nominal full load power rating. The regenerator which re- covers approximately 75% of the avail- able heat in the exhaust gases is of the extended surface type. It is expected to have this unit on shop test in early 1952.

Reduced Investment

The contribution the gas turbine can make to major gas transmission systems of 20-in. and larger diameter will be in the form of reduced capital investment for stations and lines and a lower cost per unit of gas transported as compared to gas engine driven reciprocating equip- ment. In specific cases, additional advan- tages will arise from station simplicity, freedom from large water supply prob- lems, reduced maintenance, and ease of adaptation for remote control or unat- tended operation.

In addition, the gas turbine's charac- teristic of increasing power with low ambients gives it extra rating in the win- ter months when the demand for gas is greatest. The overall suitability of the characteristics of the gas turbine-centri- fugal compressor combination of high flow and low pressure ratio make it ideal in booster service. To these advantages we can add the probability that owing to the restrictions on the use of steel, em- phasis will be given to increasing the capacity of existing lines by adding boosters in intermediate stations. The ex- tent to which the gas turbine will cap- ture this market, for which it is ideally suited, is dependent on its acceptance by operating companies as a reliable unit.

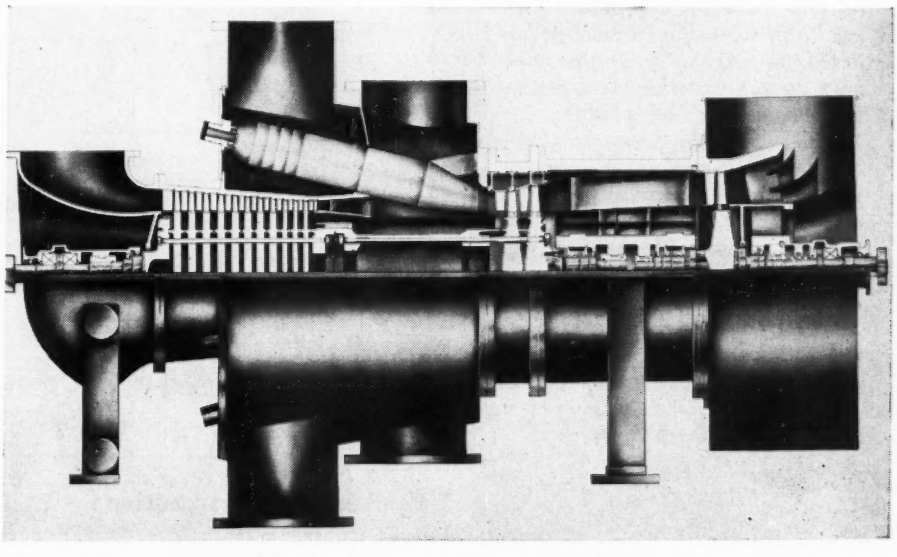


Fig. 4. Longitudinal cross section of 5000-hp. unit.

Selecting The Optimum Liquid Recovery Process

By T. H. ANDERSON JR. and W. E. COLBURN
C. F. Braun & Co., Alhambra, Calif.

Scientific knowledge of light hydrocarbons has grown with the industry. The process engineer now has tools with which to predict accurately the performance of any part of his plant. This wealth of scientific knowledge has taxed the ingenuity of the engineer to squeeze the most out of his chosen recovery process.

It is not within the scope of this article to discuss variations that can be used to increase recovery or improve performance, but rather to deal with the first step an engineer must take—selection of the basic cycle he will use.

There are four basic ways to recover liquids from wet gas—adsorption, condensation, gas fractionation, and absorption. Let's consider each cycle.

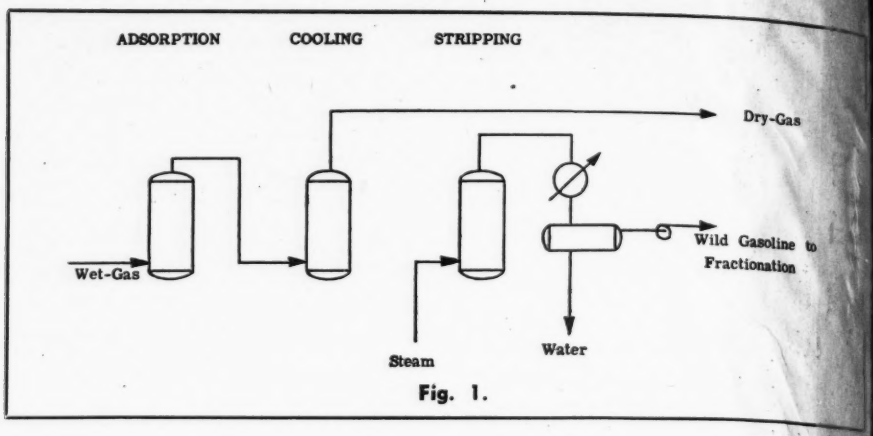


Fig. 1.

Adsorption

THE use of a solid adsorbent is a well-known method for removal of components from vapors. This process was used in some of the early gasoline plants. Activated coke was the usual adsorbent. However, the adsorbent picks up only a part of its total weight before it becomes saturated and must be regenerated. Thus, a large volume of adsorbent and batch operation is necessary.

Fig. 1 shows a simplified flow diagram of the adsorption process. In the first step wet gas goes through a bed of activated coke. The dry gas goes to the second step. Here the gas cools a bed of hot stripped coke. In the third step, adsorbed gasoline is stripped by turning steam into the coke bed. The gasoline leaves as vapor. It is condensed, separated from the water, and sent on for fractionation.

Let's look at an adsorbent plant for 30,000 gals. per day of liquid-recovery. This is some 150,000 lbs per day. According to *Perry's Chemical Engineers' Handbook*, coke will adsorb about 15 lbs of gasoline per 100 lbs of coke. At four hours per step, we would need 250 tons of coke. It is easy to see why these coke plants disappeared from the scene long ago.

However, the adsorbent cycle is selective. By proper control, the desired component can be picked out and recovered. The Hypersorption* process takes advantage of this property. It overcomes another drawback, batch operation, by the use of a moving bed. This process is in commercial use for ethylene recovery. So far we have seen no reports on commercial use of this process for propane and heavier fractions.

Until further refinements are developed, the adsorption cycle should be neglected by the process engineer. One exception is in the case of ethane or ethylene recovery. In such instances, the Hypersorption process may prove attractive. But since this process is a specialized cycle, we have not considered it in the general case of liquid recovery from hydrocarbon gases.

*For a description of the process, see *GAS*, Jan. 1947, p. 32.

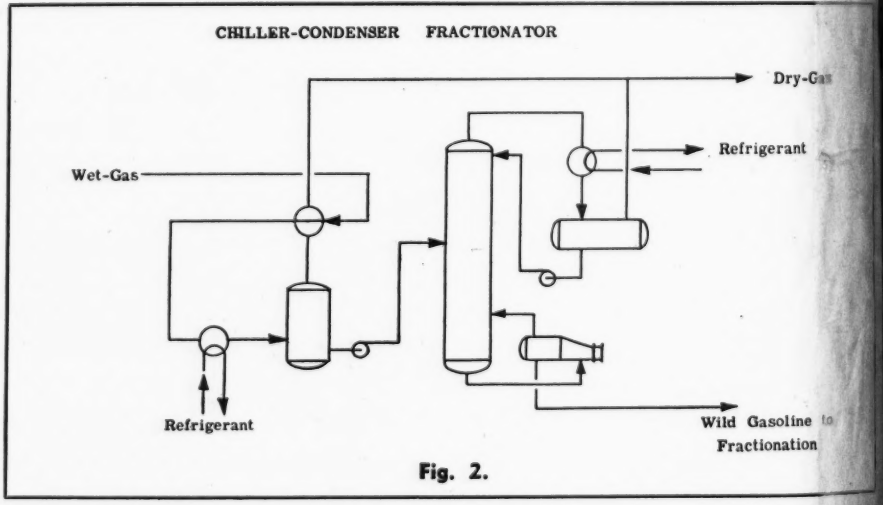


Fig. 2.

Condensate Fractionation

Condensate was the first method of recovery. Drips from the gas lines were wild and quickly evaporated at reduced pressure. Compression and condensation increased the yield. Subsequent rectifica-

ion stabilized the product. But as long as the dry gas was separated directly from the condensate, some gasoline vapors were lost.

Where rich gases are available, the compression condensation cycle is often attractive. Only one fractionator is required. The gas off the condensate is small and gasoline losses are negligible.

Fig. 2 shows a simplified flow diagram of a condensate fractionator. Here the wet gas is cooled, first by heat exchange with the dry gas, then by refrigeration. The condensate separates in the accumulator and is pumped to the fractionator. A conventional non-condensing rectifier without refrigerant is used to condense top reflux. The top product goes direct to dry gas. The bottoms spill down into the fractionation system.

Giving a constant-composition feed to the fractionator, this cycle is a boon to the operators where widely fluctuating gas rates are encountered. However, where refrigeration is necessary for desired recovery, hydrates are a problem. In such cases, drying of the feed is a must.

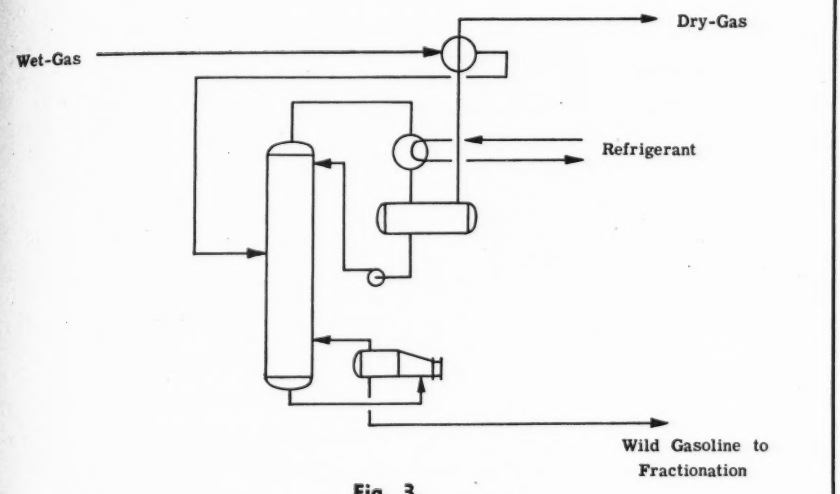


Fig. 3.

Fig. 3 shows a simplified flow diagram of this process. The compressed and cooled wet gas leaves the dehydrating unit. The gas is cooled by exchange with dry gas off the reflux drum, and the cooled mixture goes direct to the fractionating column. This is a conventional non-condensing rectifier. The overhead is cooled by refrigeration. All the condensed liquid is pumped back as reflux, and the uncondensed vapors go off as the dry-gas product. A conventional steam-reboiler is used on the bottoms. The bottoms liquid spills down to the fractionators.

Once again the engineer found himself limited to a relatively rich gas. He had to operate the column below the critical pressure of the bottoms, and he had to have enough pressure or a sufficiently low temperature in the reflux drum to have liquid in equilibrium with the dry gas. Often this required hydrate-forming temperatures. And in such cases, drying of the feed is necessary.

Gas Fractionation

The loss of gasoline in the condensate-fractionation cycle challenged the process engineer. He came back with gas fractionation. Here he compresses and cools the wet gas, then feeds the mixture to a single fractionating column. This column splits the wet gas on a key component. The lights go out as dry gas; all the heavies come out in the bottoms liquid and spill down to the fractionators.

Absorption

The absorption cycle gave the engineer the answer to high pressures and low temperatures. Using absorption oil, the designer could operate above hydrate-forming temperatures. Pressures could be adjusted to suit the specific plant conditions. Variation of the oil rate was all that was necessary to obtain the desired recovery.

Here was a cycle that could operate under any plant conditions. This is the cycle that became and still is the backbone of the vapor-recovery industry. But it was no Utopia.

The absorption oil picked up every component in the wet gas. It took two stills to strip the oil. The primary still pressure was a delicate balance to keep recycle vapors down, and excessive light ends out of the fractionating system. Low absorber pressures took high oil rates. High absorber pressures cut the oil rate but hiked the recycle.

The engineer used vent tanks and re-

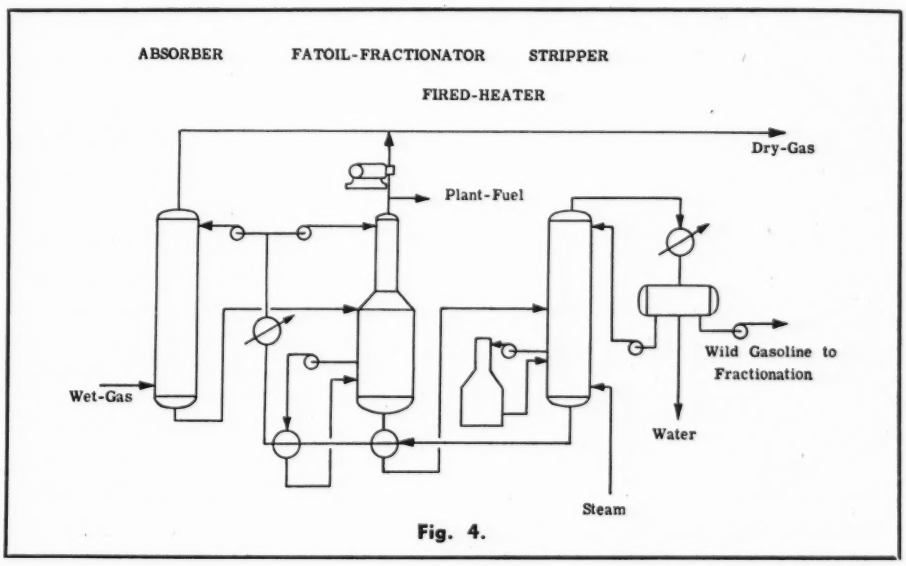
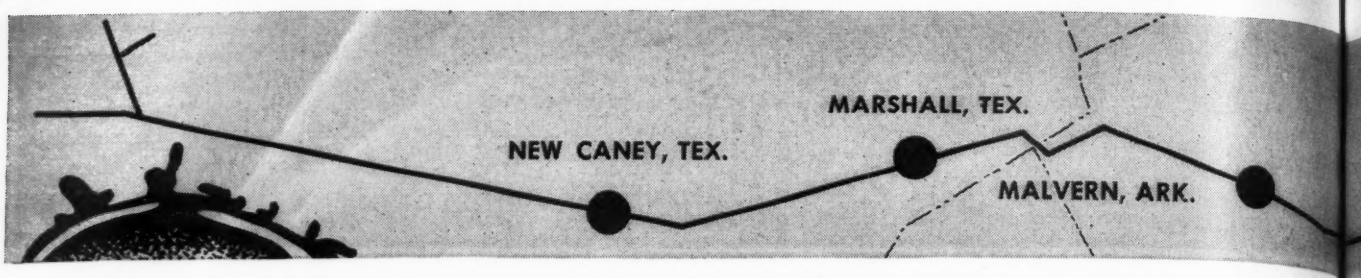


Fig. 4.

absorbers to get the recycle under control. About ten years ago, he came up with the fat oil fractionator. This column enabled him to kill the recycle and use a single still. But no matter how the engineer struggled, he still had to have at least three columns and a sizeable oil circulation rate to make his recovery.

A simple three-column absorption system is shown in *Fig. 4*. The absorber removes the gasoline and LPG from the wet gas. The fat oil fractionator takes the



Texas-Illinois Compressors 100% Worthington

25 *2000-horsepower engine compressors used in 5 stations on 1400-mile line*

THE ORIGINAL GAS PIPELINE TO CHICAGO, built by the Natural Gas Pipeline Company of America in 1931 from the Texas Panhandle field to Joliet, Illinois, used 57 Worthington 1400-hp gas-engine compressors—all that were installed at that time. (Upper line on map.) Since 1931, 48 units were added; today a total of 105 units are operating on the line.

On Dec. 5, 1951, the valve turn-on ceremonies at Joliet, Illinois, initiated the flow of additional Texas gas to the Chicago Area.

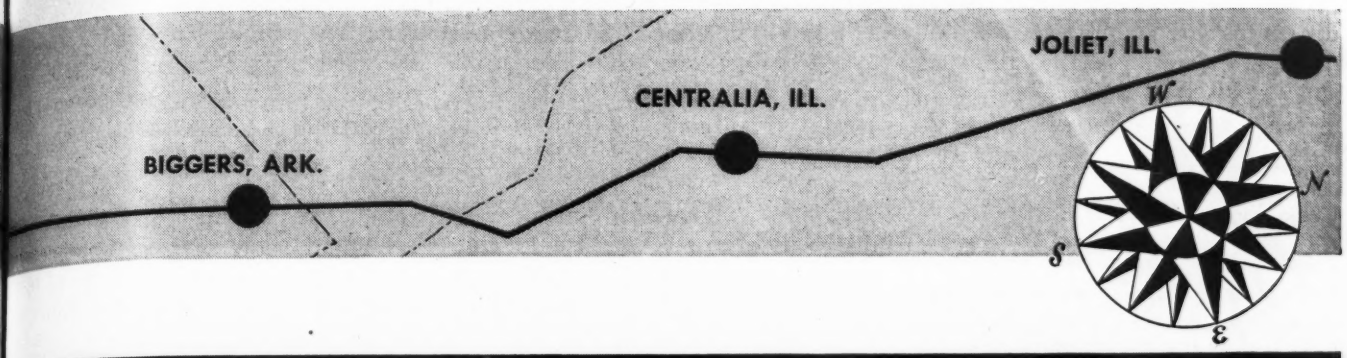
Along the new line—which will deliver 374,000,000 cu ft of gas daily—are twenty-five 2000-hp Worthington gas-engine compressors working in groups of five at stations from New Caney, Texas to Centralia, Illinois.

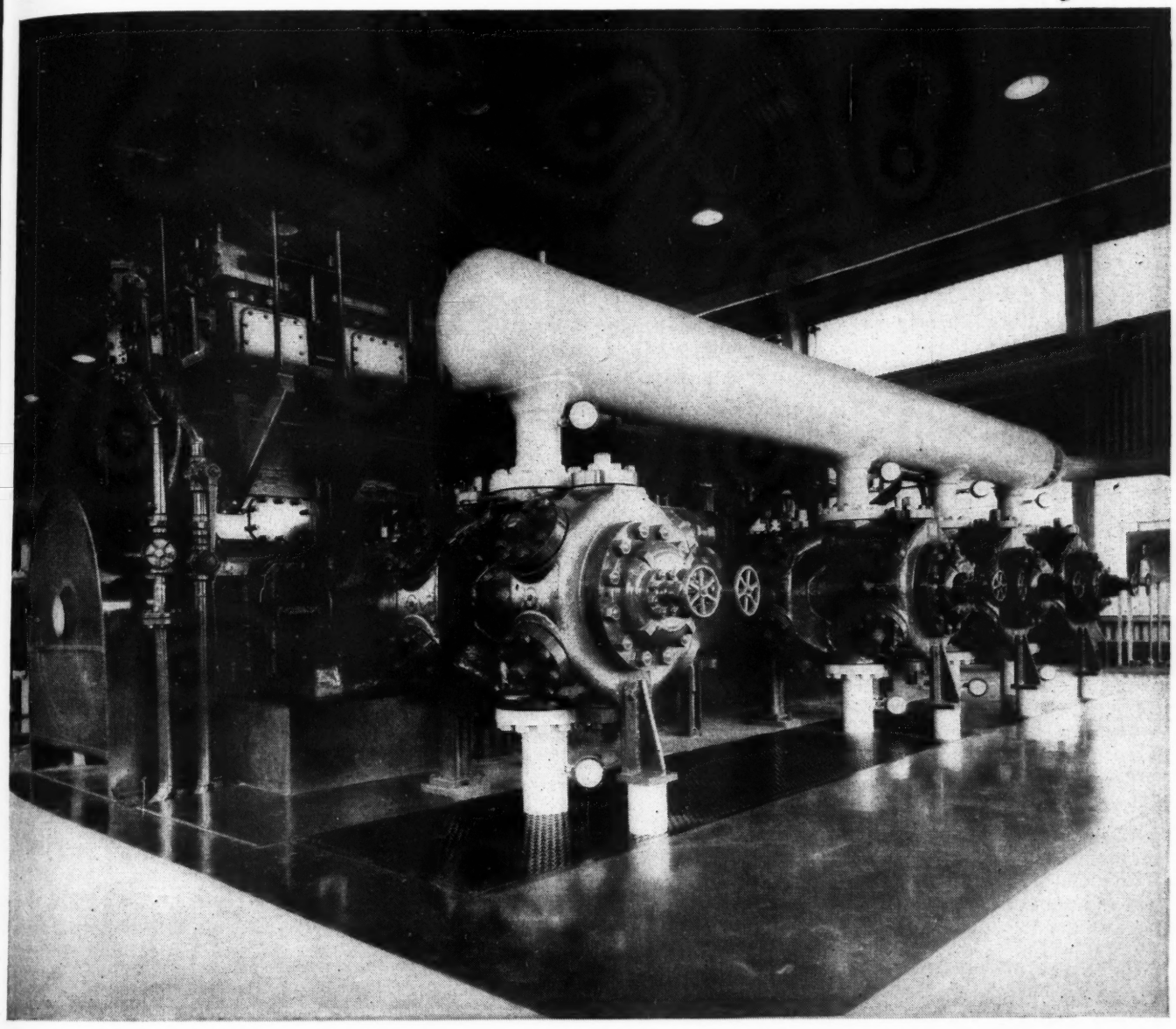
The 10-cylinder UTC-16 gas engines use Worthington's uniflo timed-scavenging method that assures a "clean-sweep" of burned gases and the smoother operation that goes with it.

Though designed primarily as a pipeline gas-engine compressor, the UTC-16 is suitable for many services including: pressure maintenance on oil wells . . . in natural gasoline plants . . . in oil refineries for solvent extraction, vapor recovery, recycling and stabilization of gases . . . in petro-chemical processing of products made from natural gas under pressure . . . and in many refrigeration applications.

The uniflo UTC-16 is built in sizes from 1000 to 2000 hp. If your process requires gas compression and you have a suitable gas available for fuel, the Worthington UTC-16 will do a better job for you. For complete information contact your nearest Worthington District Office or write Worthington Pump and Machinery Corporation, Engine Sales Division, Buffalo, N. Y.

NO OTHER COMPRESSOR WILL





WORTHINGTON 2000-hp 10-CYLINDER ENGINE-COMPRESSORS at New Caney, Texas, station of the new Gulf Coast-Chicago pipeline of the Texas-Illinois Natural Gas Pipeline Company. These engines use Worthington's uniflo thru-scavenging system—a design thoroughly proved by years of research by Worthington.

PORTABLE COMPRESSORS

RADIAL

GAS ENGINE COMPRESSORS

OUTPERFORM A WORTHINGTON

WORTHINGTON

Engine Compressors

EK.2.1

dry gas fractions out of the fat oil. The overhead gas usually goes to plant fuel, and any excess is recompressed to dry gas. The stabilized fat oil goes to the stripper where heat and steam are used to split the gasoline out of the fat oil. Lean oil comes out the bottom of the stripper; steam and recovered fractions come out the top. They are condensed, the water is separated and drawn off in the accumulator, and the wild gasoline is pumped to the fractionators.

Choosing a Cycle

As usual, we find several features we like and several things we would prefer to avoid in each cycle. The engineer must first select the best cycle for his recovery, then work out the refinements. If he works up all cycles with refinements, he finds himself in an endless task. He must choose at the start. We will confine our discussion to the basic factors he needs to make his selection.

Feed rate affects the size of equipment. Variations in rate may temper his selection. But such factors affect all cycles in about equal proportions. The richness of feed and the entering pressure levels are basic factors which help make one cycle more economical than another.

The same recovery makes the same raw gasoline. The number of liquid products will set the number of columns in the fractionating section. Thus, the fractionation section will usually be the same for all cycles, but the percentage of recovery makes the big difference.

Dry gas conditions at plant limits play a major role. The pipeline or repressuring pressure usually sets the maximum pressure in the plant. The exception is in refinery gas plants where tail-gas pressures are so low the engineer must use higher pressures to keep equipment sizes within bounds.

Pipeline operators have had their troubles with hydrates. If the tail-gas is sold, it often has to meet a low dew point. In such cases, drying equipment is required and the engineer can use temperatures down to the dew point. Pressure maintenance, cycling, and refinery gas plants as a rule use the dry gas before it can be chilled to hydrate-forming temperatures. In these plants, the engineer must keep his temperatures out of hydrate zones or save enough to justify a drying system.

Utilities are not a problem at this stage of the process design. Utility levels can be adjusted within reasonable limits without materially affecting the economics of the design. Limiting cooling water temperature is the one fixed item. The engineer must stay within this limit or be prepared to pay for refrigeration.

We have three factors to consider when selecting our basic cycle: (1) The feed gas—its composition, rate, and entering pressure. (2) Recovery or range of recovery desired. (3) Dry gas—its exit pressure and dew point. And we keep our eye on the cooling water temperature.

Applying the Factors: An Example

Let's follow the engineer as he applies these factors in the selection of a cycle. In our example, the feed is 24 million standard cubic feet per day of wet gas. The pressure at the plot-edge is atmospheric. The gas composition is as follows:

Composition	Mol Percent
C_1	52.5
C_2	25.8
C_3	13.8
iC_4	2.0
nC_4	3.7
iC_5	.7
nC_5	.6
C_6+	.9
	100.0

The dry gas will be sold. The sales contract calls for gas to be delivered at 500 psig with a −10°F dew point. Propane, butanes, and 20-RVP gasoline are the liquid products, with 75% maximum propane recovery to meet winter demands. Cooling water temperature for design is 70°F.

With these conditions, the process falls into four steps: (1) Compression. (2) Drying. (3) Liquid-recovery. (4) Fractionation.

The compression section must lift the gas to about 535 psig. This allows 35 psig for pressure drop and control and meets the 500-psig requirement at the plant fence. Since this pressure is below the 800-psig retrograde point, all cycles will be more efficient at this top pressure level. Thus, the same compression section will be common to all cycles.

The dry gas dew point requires a drying section. Pressure assists the drying, so the drying section goes after the compressors. Either wet or dry gas can be dried. There would be little difference in either drying section. It is preferable to dry the wet gas, since this gives greater latitude in the recovery process. Then temperatures can be used down to the dew point without encountering hydrates. The drying section becomes common to all cycles.

Both condensate and gas fractionation would deliver an ethane-free liquid to the fractionation section. An absorption section using a fat oil fractionator for 75% propane recovery would also deliver an essentially ethane-free raw gasoline to the fractionation section. Thus we can expect the same raw gasoline feed from any cycle and the engineer can eliminate the fractionation section from considerations affecting his choice of cycle.

By these quick evaluations, the engineer finds he can focus his attention on the recovery section alone, but he must stay within pressure and temperature limits. His pressure limit is 500 psig. With 70°F cooling water, 80°F is his temperature limit without refrigeration. With refrigeration, 0°F is a reasonable minimum temperature with a —10°F dew point.

Any increased pressure or lower temperature would require extra equipment in another section. If the cycle is not economical within these temperature and pressure limits, the chances are practically nil that it could both justify additional equipment and become the optimum cycle at the same time. It is a good rule that the engineer should not look outside his limits for the optimum cycle.

The easiest cycle to check is the compression-condensation cycle. All that is necessary is a check on recovery at maximum pressure and minimum tempera-

TABLE 1. Approximate Requirements of Each Cycle

	Rough Price	Fuel Consumption (Mscf/d)	Compressor Horsepower
Absorption	$3,750,000	2500	6000
Condensate Fractionation	$3,500,000	2000	7300
Gas Fractionation	$3,500,000	2000	6900

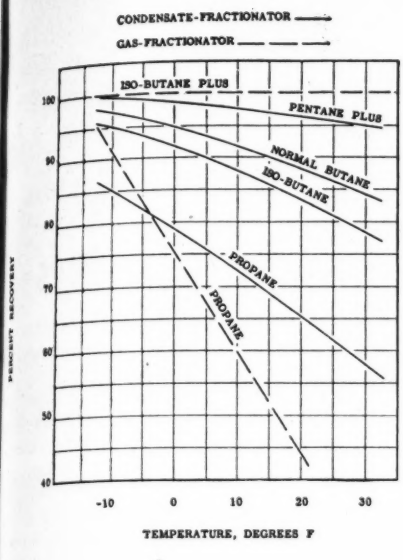


Fig. 5. Percent recovery versus temperature.

ture, 525 psig and 0°F in our case. Under these conditions, some 43 mol percent condenses. This gives about 79% propane recovery after losses in the condensate fractionator, 94% butane recovery, and 99% pentanes-plus.

For gas fractionation the engineer checks equilibrium in the reflux drum between the dry gas and the reflux. Again limiting pressures and temperatures are used. At 525 psig and 0°F, propane recovery is 75%; isobutane and heavier, 100%. The bottoms critical pressure is about 650 psig. This cycle meets requirements.

The next step is to check the absorption cycle. Here the engineer uses 525-psig main absorber pressure and 80°F lean oil. Refrigeration and intercooling are not considered because they are refinements. As such they do not affect the selection of the basic recovery process. Fat oil fractionator and still pressures are established, and the oil rate is calculated for 75% propane recovery—340 gpm.

Often this initial check eliminates one or two processes at the start. In our case all are tenable. But how do they compare in cost and utility consumption? The engineer rough-sizes and rough-prices each cycle. He approximates the fuel and steam requirements. For a common denominator we convert all heat to fuel. This shows the gross heat input. Since the feed and products enter and leave at essentially the same temperature, the fuel requirement indicates the relative cooling load.

Table I shows the approximate costs, fuel requirements, and compressor horsepower. Plant costs are total for the plant, ready to operate but less operating supplies, chemicals, and the like. The total fuel figure includes direct-fired fuel, steam converted to fuel at 80% efficiency, and compressor fuel for both gas and refrigeration. Compressor horsepower is total for gas compression and refrigeration.

The absorption plant would cost around $3¾ million; either fractionator, around $3½ million. Comparing utilities, the total fuel for the absorption plant would be 2½ MMscf/d, but only 2 MMscf/d for the fractionators. Some 6000 hp is required for gas compression. Refrigeration requirements raise the horsepower to 7300 for condensate fractionation, 6900 for gas fractionation. The gas and condensate fractionators are a standoff, running a shade under the absorption plant in capital investment and some 20% under in fuel requirements.

Fig. 5 shows the variation in percent recovery with temperature for the gas and condensate fractionators. The temperature shown refers to the lowest temperature in the unit. In the condensate fractionator it occurs at the outlet of the condensate chiller and, in the reflux drum, on the gas fractionator. The solid lines show the condensate-fractionator recovery. With rising temperature, propane recovery falls off at a rapid rate; butane recoveries drop, but not as fast; and pentanes-plus fall slightly. This is typical for condensate fractionators.

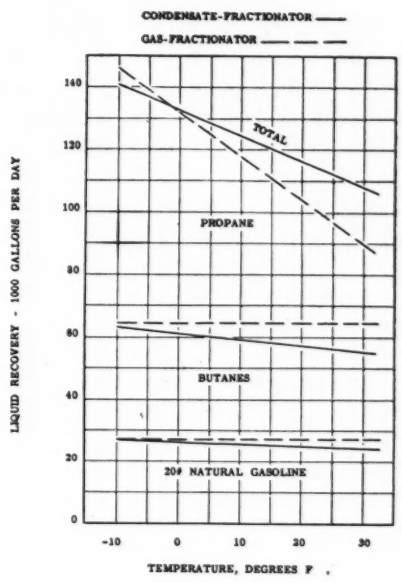


Fig. 6. Liquid recovery versus temperature.

The broken lines show the gas fractionator recoveries. Here the propane recovery falls rapidly with increasing temperature, but the isobutane and heavier stay at 100%. This is typical of gas fractionators. In our case, the reflux drum temperature sets the propane recovery. It is flexible over a wide range without disturbing the isobutane and heavier recovery. This fits in nicely with a seasonal propane demand. But how

Fig. 7. Typical absorption plant with nine columns includes deethanizer.

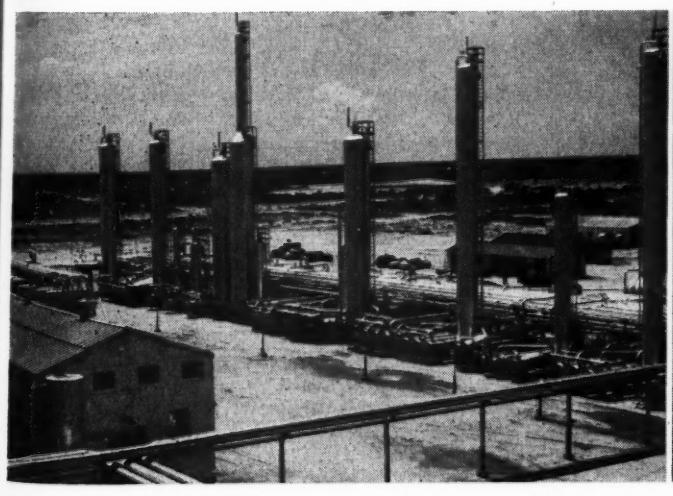
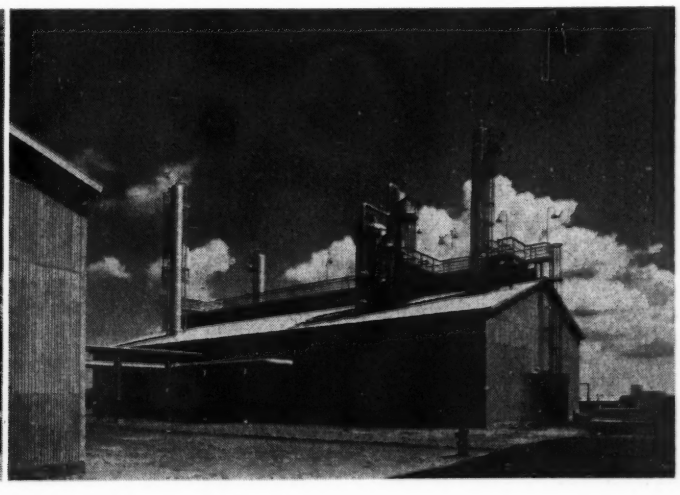


Fig. 8. Gas fractionator shown as housed for operation in subzero weather.



does this look in terms of gallons produced?

The total gallons produced per day by the gas and condensate fractionators is shown in *Fig. 6.* Again the solid lines show the condensate recovery, the broken lines the gas fractionator recovery. At 0°F both the condensate and the gas fractionator produce the same total gallons. The condensate fractionator produces more propane, less butane, and a little less gasoline than the gas fractionator, but the butanes and gasoline are worth more than propane. Also, the propane demand in our case is seasonal. During the summer the condensate fractionator has to condense the propane to hold a high butane and gasoline recovery. The gas fractionator can reject propane by increasing the reflux temperature. No butanes or gasoline are lost, and the refrigeration load is lightened when cooling-water conditions are most adverse.

Fig. 7 shows a typical absorption plant. Although it would normally have several columns, this one has nine, since hydrogen sulfide removal and a de-ethanizer are included. The de-ethanizer enables this plant to get 80% or better propane recovery. From left to right we have the hydrogen sulfide removal unit—the absorber and then the regenerator. The two small columns are the dehydrating unit—first the regenerator, then the absorber. Next is the main absorber. The milk bottle column is the fat oil fractionator, then the stripper, followed by the depropanizer, the de-ethanizer, and the debutanizer, all in the line of flow.

Fig. 8 shows a gas fractionator. The equipment is housed for operation in —40° weather. The column in the right foreground is the dehydrator regenerator. The two center columns are the gas fractionator in the left front and the dehydrator absorber immediately behind on the right. In the left foreground is the depropanizer and in the background the debutanizer with five columns to do the job. The liquid recovery and fractionation sections have conventional rectifying columns.

The economics point to the gas fractionation process for these conditions. The first cost is slightly under the absorption cycle. With less fuel there are lower utility costs. There is no loss of butanes and heavier and the propane recovery can be varied widely without loss of butanes and gasoline. In operation we have a single column instead of three to make our liquid recovery.

This article was originally presented at the October annual meeting of the California Natural Gasoline Assn. in Los Angeles.

Solid Future Assured

Pipelines are Cheapest Carriers

What does the future hold for pipelines? Do they have the flexibility and other characteristics required to help them weather adversities in economics and fuel price-and-use relationships? Speaking before the Pipeline Contractors Assn. convention at Houston last month, Gardiner Symonds, president of Tennessee Gas Transmission Co., gave some answers. The following paragraphs are excerpted from his address:

One of the acid tests of transportation efficiency is financial: How cheaply can it do the job, compared to its competition?

Paul Kayser (I believe it was) said last year that his studies revealed that the most efficient method of transportation of a kilowatt hour of energy is that of oil by high pressure large-diameter pipelines (with the exception of tanker transportation where water is available), that the next most efficient method of transporting a unit of energy is by the transportation of 1000-Btu natural gas by high-pressure large-diameter pipelines, and that the transportation of coal by railroad is the most inefficient method of transporting such energy.

No industry-wide comparative tariff or rates appear available on pipelines and competing transportation media. But some spot-checks, using oil and gasoline as products transported alike by both pipelines and rail, show a rate position highly favorable competitively to pipelines.

Calculations from the tariffs on file in the office of one of Houston's large oil companies show that rail rate to ship a 42-gal. barrel of crude oil from Albany or Ranger, Texas to Neodesha, Kan. is $1.35, while by pipeline the rate is 25 cents per barrel—less than one-fifth as much.

Gasoline is another product transported by both pipeline and rail.

The West Tulsa-to-Des Moines pipeline rate of 36 cents per barrel is roughly 29% of the $1.26 rail rate. The Cushing (Okla.)-to-Omaha pipeline rate of 42 cents is about one-third of the $1.23 rail rate.

To these rates there must be added the additional costs of terminaling and handling to have a proper comparison with the pipeline.

In view of these figures, it is not surprising that in 1949 5 million tons of crude oil moved by rail, compared to 211 million tons by pipeline—about 1 to 40.

While gasoline shipments by rail still are substantially larger than those by pipeline, pipelines are gaining and railroads losing gasoline volume. Pipeline gasoline volume in 1949 was three times that of 1939, rail volume roughly one-third.

A pipeline's uses for water, oil, petroleum products and for gas are well-known. In addition, a relatively new but growing use is to transport hydrocarbons extracted from gas or oil to point of use as chemical raw materials. The 58-mile, 8-in. line which transports hydrocarbons from the Tennessee Gas hydrocarbon recovery plant or stripping plant, to the Mathieson Chemical plant in Kentucky is one example.

Among other chemicals to be transported by pipeline which either now are in operation or under construction, are salt brine, oxygen, liquid chlorine, and ethylene dichloride.

The idea of moving solids through pipelines, while not absolutely new, is being put into effect on a fairly ambitious scale.

The Pittsburgh Consolidation Coal Co. has a project to pump coal through a 12-in. pipeline about three miles long. They have developed a method by which coal is suspended in a slurry which is pumped through the line, after which the slurry is dried. The coal then is pulverized or pressed into briquets for delivery to the customer. Line cost is estimated at $550,000, with rated capacity several thousand tons per day.

Cost of transportation is expected to be 50 to 75% less than on a one-belt conveyor; operating costs are estimated as lower than with air tramways, and capital costs at less than with surface haulage or trucking systems.

Pipelines have their major uses today for gas, oil, and petroleum products, and most persons think of those substances when they think of pipelines. But neither the oil industry nor the gas industry has any monopoly on the pipeline.

For example, the coal industry has opposed the extension of gas pipelines rather consistently. This is human and understandable, though it has not been too effective and often has been short-sighted.

But the coal industry of late has been eyeing the pipeline and through research and experiment has been trying to adapt the fuel to utilize the pipeline's advantages. This, in my opinion, is progressive and forward-looking, and in either the long run or short haul will pay dividends both to the public and to the coal industry.

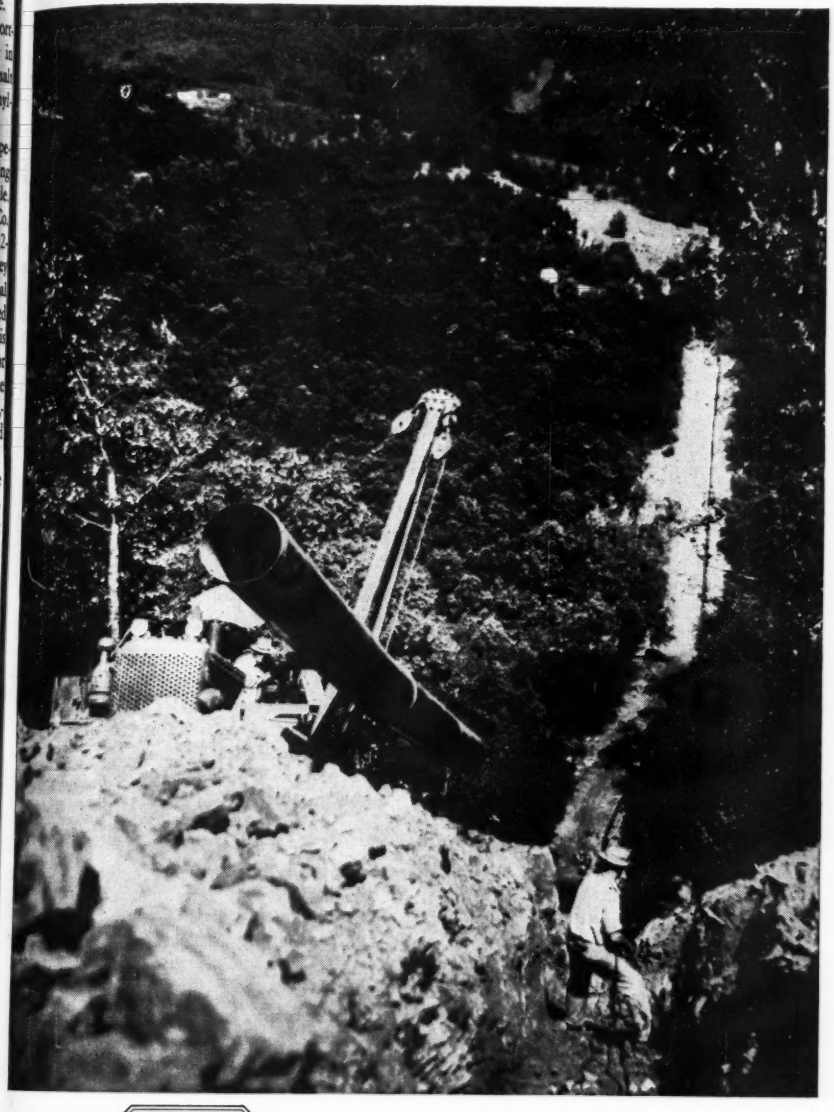
The important thing is that many people, recognizing the inherent merits of the pipeline, are doing some serious thinking and research on how to make use of them.

Coal spokesmen have made statements to the effect that the pipelines now transporting natural gas to the North and East can be used to transport coal gas back to the Southwest, when natural gas runs out. Purpose of these statements, in my opinion, was chiefly one of scare propaganda.

But there is really nothing inherently wrong with the idea of transporting coal gas in pipelines which now transport natural gas, so long as proper time relation is kept in mind.

Mountain-climbing pipe line being laid for keeps!

IT'S PROTECTED BY BITUMASTIC ENAMEL!

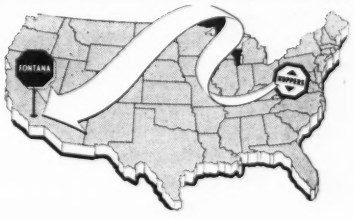


THE 26-INCH natural gas pipe line, shown here, was laid across the most mountainous part of West Virginia for the Atlantic Seaboard Corporation. Here's a sample of what the pipe liners were up against: at one point the face of Cave Mountain rose at an average rate of 45 degrees, climbing for 1,700 feet before easing off to a more gradual slope.

When pipe lines are laid under such back-breaking conditions, they *must* go down to stay . . . they *must* be fully protected against corrosion. That's why this pipe line was coated with Bitumastic® 70-B Enamel.

Bitumastic® Enamels have established remarkable records in preventing corrosion — under the most severe corrosive conditions . . . in all types of soil . . . under wide variations of temperature. Thanks to these durable enamels, many gas and oil pipe lines, laid 20 and 30 years ago, are still giving good service today.

Specify Bitumastic Enamels and make certain *your* pipe-line projects get the most effective protection against corrosion. Your Koppers representative will give you complete details and estimates.



Bitumastic Enamels soon available from Koppers new California Plant!

As soon as present construction work is completed, Koppers will be able to supply Bitumastic Enamels from a new plant at Fontana, California. The plant is being built to give you better service in the West.

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PIPELINE NEWS

Royalty Owners Request Wellhead Price Increase

Royalty owners in the Guymon-Hugoton gas area of Texas county, Okla., have taken the initiative in asking the Oklahoma Corporation Commission for an increase in the price of natural gas at the wellhead.

They are seeking a minimum price of 9.8262 cents per Mcf, measured at a pressure of 14.65 psi, or the equivalent of about 11 cents at the field-metered pressure rates. Present field gas price for Oklahoma is 7 cents per Mcf at 14.65 psi, as set by Order No. 19515 issued by the commission on Dec. 9, 1946, effective Jan. 1, 1947, and upheld by the Oklahoma supreme court in December 1947. That order was obtained on an application of Peerless Oil & Gas Co. vs. Cities Service Gas Co. The royalty owners were intervenors in that proceeding.

The present application, filed by T. Murray Robinson, Oklahoma City attorney for "several hundred resident royalty owners," was set for hearing before the corporation commission on Jan. 15. It is based on the same general principle which was sustained in the former corporation commission order: that the field price has an important bearing on preventing waste, physical and economic, and therefore that an adequate price is justified as a conservation measure.

The Robinson application asserts that the intrinsic value of gas at the wellhead is not less than 10 cents per Mcf and that negotiated sales recently have been made at a price "which is equal to not less than 9.8262 cents."

Allocation of Transco Gas Studied by Commission

Equating of supplies and demand on emergency and temporary bases, among customers and potential customers of Transcontinental Gas Pipe Line Corp., was being worked out late last month when the FPC called the company in for huddles on gas allocation problems.

The first hearing was due to start Jan. 23, and involved Texas Eastern Transmission Corp., along with Transco. The two companies were seeking approval for an emergency exchange plan, whereby 60 MMcf per day could be switched from one company's system to the other's as required. Texas Eastern planned to install a $6500 interconnection at a juncture of the two systems near Beaumont, Texas, to handle the exchange.

The gas would be delivered to Philadelphia Electric Co., Philadelphia Gas Works, or Public Service, Newark, as needed in emergencies. All three are served by both companies.

Five days later, Transco was scheduled to present its plan for temporary "disposition" of 64 MMcf per day. Previously authorized for delivery to Northeastern Gas Transmission Co. in New England, which may not need it until September 1953, or later, the 64 million would be split among Columbia Gas System, whose request for 18 MMcf was already authorized and incorporated in exchange agreements; Con Ed of New York, 15 MMcf; Brooklyn Union, 6 MMcf; Public Service, Newark, 16 MMcf; Philadelphia Electric, 7½ MMcf; and Long Island Lighting, 1½ MMcf.

Northwest Natural Alters Alberta Import Blueprint

In connection with its plan to transport gas from Canada to markets in Idaho, Washington, and Oregon, Northwest Natural Gas Co. has filed an amended application with FPC.

As amended, the system would have a maximum daily delivery capacity of 285 MMcf and would cost $92 million, including gathering and transmission facilities in Canada. Four compressor stations with a total of 24,750 hp, 645 miles of 24- to 18-in. line, and lateral lines would be built.

Gas which Northwest proposes to import would be gathered in Alberta by Alberta Natural Gas Grid Ltd., a subsidiary, and Alberta Natural Gas Co., another subsidiary, would transport the gas in Canada.

Northwest, with its two subsidiaries, also has an application pending with the Alberta Petroleum & Natural Gas Conservation Board for permission to remove gas from the province.

BS&B Expands in West

Ross Baze

Two California offices have been opened by Black, Sivalls & Bryson Inc., Kansas City, to handle the company's complete line of oilfield products, safety heads, and Climax controls.

Ross Baze, named west coast sales manager, will headquarter in Los Angeles and will be assisted in San Francisco by Warren J. May and in Los Angeles by Bill Lacy, both sales engineers.

Mr. Baze joined Hanlon-Waters, which was later taken over by Climax Industries, in 1944. Later, when BS&B bought Climax, he was appointed sales manager of the Climax control division.

Gas For Fairfield, Ill.

An FPC presiding examiner has filed an initial decision directing Trunkline Gas Co., Houston, to connect its system with the facilities of Fairfield, Ill. about 11 miles west of the city and deliver up to 1.2 MMcf daily from its 26-in. Louisiana-Illinois line.

Fairfield now has no gas distribution system, but last April the voters authorized construction of such a system and a connecting line for about $533,500. Trunkline would have to build 100 ft of line and a measuring station, estimated to cost $16,750. If authorized to do so by FPC, Trunkline is willing to make the connection and supply the gas.

Project to Up Capacity of Texas Gas Okayed

To enable Texas Gas Transmission Corp. to increase off peak delivery capacity by 12.7 MMcf of natural per day, temporary FPC authorization has been granted for construction of a new 5280-hp compressor station at Madison, Ind. and installation of an additional 6960 hp at four existing stations located at Kenton, Tenn. and Calvert City, Slaughters, and Hardinsburg, Ky.

Part of an overall construction program now pending before the commission, including plans for installation of 26,860 additional horsepower and construction of 407 miles of line, the approved facilities are estimated to cost $2,992,760.

In requesting authorization, Texas Gas stated that Louisville (Ky.) Gas & Electric Co. and the Ohio Fuel Gas Co., Columbus, located in the area in which gas will be made available, have presented evidence of a critical need for additional gas this winter. However, the commission stated it was reserving the right to modify the proposed disposition of the gas.

Conyes Fills Vacancy in Contractors Assn. Office

Speaking at the fourth annual convention of the Pipe Line Contractors Assn. in Houston last month, President Gardiner Symonds of Tennessee Gas Transmission Co. declared that the race for franchise territory to build large natural gas carriers is just about a thing of the past.

Although the principal lines have been built, he said, transmission companies will continue to add capacity by construction of loop lines and the addition of compressor horsepower. Mr. Symonds predicted that a substantial amount of pipe will be laid this year, although not as much as during 1951.

A. I. Forbes, Associated Pipeline Contractors Inc., Houston, was elected president of the association, succeeding Laurence H. Favrot, Houston Contracting Co. On the following day, however, Mr. Forbes died of a heart attack (see "Pipeline People," p. 124). Robert A. Conyes, Conyes Construction Co., San Pablo, Calif., had been re-elected a vice president and will take over as president of the organization.

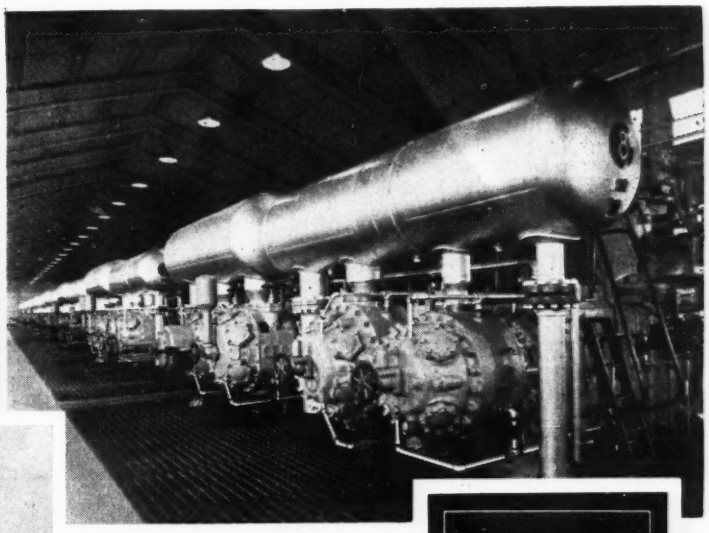
Other officers include Maurice S. Williams, Anderson Bros. Corp., Houston, vice president; Clark C. Bledsoe, Midwestern Constructors Inc., Tulsa, treasurer; and Richard A. Gump, Dallas, reappointed executive secretary. In addition, four two-year directors were named.

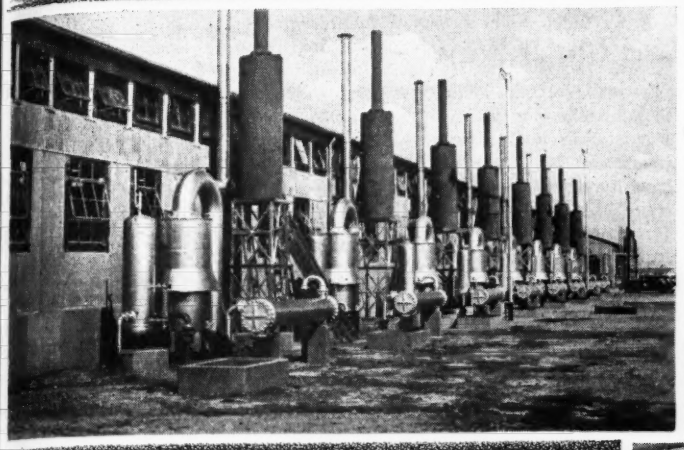
Building Project Proposed

United Natural Gas Co. and an affiliate, The Sylvania Corp., both of Oil City, Pa., are seeking FPC authority to build facilities designed to permit United to handle additional quantities of natural gas.

Included in United's $743,000 project are

How they lined up efficiency



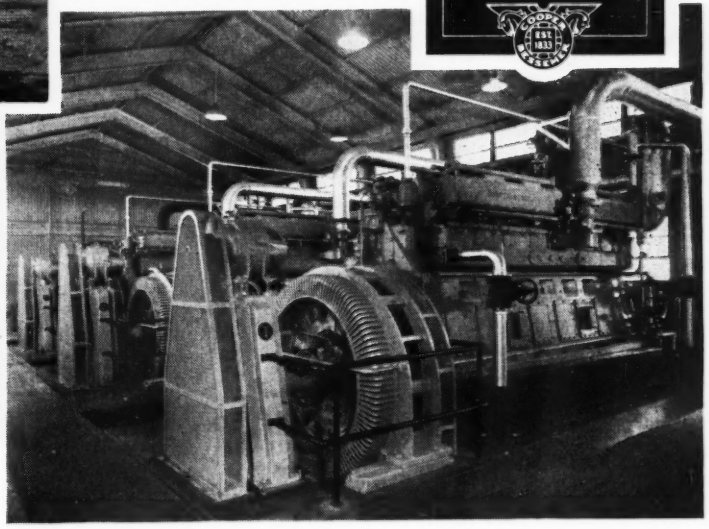


GMV'S FOR COMPRESSING

JS' FOR GENERATING

Another Example of Efficient Power at Lower Cost

to save dollars at Dollarhide



● The Dollarhide Plant, operated by The Pure Oil Company, is a "beautiful" plant, say those who have seen it—one of the newest, most efficient gasoline plants today.

Those Cooper-Bessemer GMV compressors and JS gas engines do make an impressive line-up, but more important, they *line up* a combination of reliability and efficiency you just can't beat. That's why they're on this and so many other important jobs.

The compressor line consists of eight 10-cylinder GMV's, all supercharged, for a total of 10,040 compressor hp (at 3150' elevation). Each is a 3-stage compressor, zero suction to 650 lbs. discharge, with automatic speed control and manually operated unloading. This minimizes maintenance and attention without risking a suction pressure drop that would allow air to enter the sour gas stream.

There are modern Cooper-Bessemer V-angles . . . GMV's, GMX's and GMW's from 220 to 3,000 bhp . . . that will efficiently meet your needs no matter how exacting or complex.

The **Cooper-Bessemer** *Corporation*

MOUNT VERNON, OHIO — GROVE CITY, PENNA.

New York, N. Y. Washington, D. C. Bradford, Penna. Parkersburg, W. Va.
San Francisco, Calif. Houston, Dallas, Greggton, Pampa and
Odessa, Texas Seattle, Wash. Tulsa, Okla. Shreveport, La.
St. Louis, Mo. Los Angeles, Calif. Chicago, Illinois Caracas, Venezuela

(1) 10½ miles of 12-in. line in Venango county, Pa. to replace an 8-in. line; (2) replacement of about 10 miles of 3-, 4-, and 5⅝-in. line with 6-in. in Warren county; and (3) 2000 ft of 12-in. line in Venango county.

Sylvania would replace 12,000 ft of 8-in. and 6500 ft of 4-in. with 12¾-in. and 6⅝-in., respectively, in Steuben county, N. Y. and would add 400 hp at its Tuscarora storage compressor station. Cost is estimated at $390,500.

Trans-Northwest Battles To Serve Gas in Northwest

Trans-Northwest Gas Inc., a Spokane company which is seeking to transmit natural gas in Idaho and Washington, recently was rebuffed by the Idaho Supreme Court which reversed an Idaho Public Utilities Commission order giving Trans-Northwest a certificate of convenience and necessity for Idaho operations.

Ground for the decision was the failure of the commission to give Northwest Natural Gas Co., which has contracts for deliveries from Alberta producers, a hearing. Trans-Northwest has no gas supplies but plans to buy from whatever firm gets export rights from Canada.

Seattle Gas Co. has opposed Trans-Northwest's efforts to obtain right of ways in Washington, asserting that the company's plan calls for an unnecessary middleman. The Spokane firm, however, has obtained right of ways in several Washington counties and has an application pending before the state highways department.

A resumption of the legal battle before the Idaho commission was predicted by both sides.

Algonquin Line Under Way

Algonquin Gas Transmission Co.'s New England line was to get under way in mid-January, with the first 21-mile section from the Big Inch at Lambertville, N. J. to north of Somerville to be completed in March.

Ultimately, the line will run to Boston. The first customers to benefit from the line, late this year, will be some 10,000 residents of the Dover-Boonton area in New Jersey, for whom a lateral link to the main line will be built by Jersey Central Power & Light Co., Asbury Park.

Contractor for the first section is Construction Service Co.

Capacity Increase Asked

Kansas-Nebraska Natural Gas Co. Inc., Phillipsburg, Kan., has requested FPC permission to build facilities to up its system capacity from the presently authorized 182,600 Mcf daily to 193,300.

Estimated to cost $2,315,220, the project includes 179 miles of line in Kansas and Nebraska, rearrangement of certain compressors, and stub lines and metering stations to serve new industrial customers. The firm also wants to substitute 10¾-in. pipe for 8⅝-in. on an authorized 52-mile line in Nebraska.

Part of the new line would replace existing sections, totaling about 93 miles, which would be removed and salvaged. New communities to be served are Wisner and Pilger.

PIPELINE PEOPLE

Roy Johnson

With the appointment of ROY W. P. JOHNSON to its New York Office, Cooper-Bessemer Corp., Mount Vernon, Ohio, has expanded its sales engineering facilities. Mr. Johnson has received comprehensive engineering training on engine and motor-driven compressors at the Mount Vernon factory. Under the direction of James W. Reed, he will consult with engineering firms in regard to design and construction of pipelines, petroleum process, and allied refining and industrial applications.

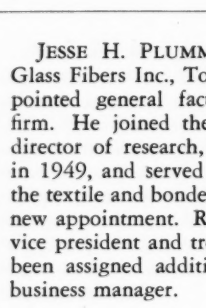
LINCOLN D. HALL has been appointed district manager in charge of the Mid-Continent territory for Tube Turns Inc., Louisville, Ky., succeeding ROBERT S. TYLER JR., who resigned to join the newly established Tyler-Dawson Supply Co., Tulsa. Mr. Hall, former west coast sales manager for Taylor Forge & Pipe Works, will headquarter in Tulsa.

At a recent meeting of the board of directors of Glass Fibers Inc., Toledo, RAYMOND W. CAPSUL was elected vice president and general sales manager. Mr. Capsul joined the firm in 1948 as electrical division manager and was promoted to general sales manager in July 1949.

New vice president of production for U. S. Steel Co.'s Consolidated Western Steel Division, Los Angeles, is CHARLES W. LEE, who has been vice president in charge of operations at the division's Orange, Texas plant since 1946. He succeeded LLOYD EARL, who resigned.

JESSE H. PLUMMER, vice president of Glass Fibers Inc., Toledo, has also been appointed general factories manager of the firm. He joined the company in 1947 as director of research, became vice president in 1949, and served as general manager of the textile and bonded mat division until his new appointment. RAYMOND F. MENSING, vice president and treasurer since 1949, has been assigned additional duties as general business manager.

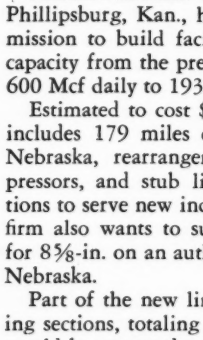
Three home office executives of H. C. Price Co., Bartlesville, Okla., have been promoted. JOHN M. THOMAS, manager of the pipeline division, was named a vice president; ELMER L. GALLERY, secretary-treasurer, is now vice president and treasurer; and JOHN P. OVERTON, assistant treasurer, was promoted to secretary.



Lester B. Swan

LESTER B. SWAN, general manager of United Oilwell Service, S. A., in Caracas, Venezuela, has been named assistant manager of Dowell Inc. and will move to Tulsa within a few months. United, a Dowell associate, will move TROMER SMITH, eastern division manager, to the South American post. BASIL HODGES, who has been with United since early 1950, will replace Mr. Smith. Before his appointment as general manager of United in 1949, Mr. Swan was New Orleans manager of Dowell. Prior to that, he served as a development engineer at Tulsa.

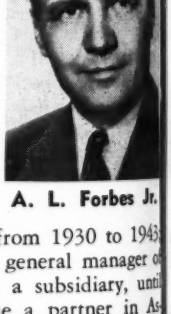
Heading a list of appointments and promotions at National Supply Co.'s (Pittsburgh) engine division in Springfield, Ohio is CHARLES K. OLSON, named assistant general manager. He was assistant vice president and general manager of Baldwin-Lima-Hamilton Corp. New staff assistant to the general manager is P. W. PLACE.



Linden Stuart Jr.

Offices and warehouse of Stuart Steel Protection Corp., a new firm recently formed by LINDEN STUART, chairman of the board, and LINDEN STUART JR., president, are located at Kenilworth, N. J. The company is eastern distributor of Dowell magnesium anodes and will also handle a complete line of cathodic protection supplies and equipment. A service department will be maintained. Both founders were formerly associated with Wailes Dove-Hermiston Corp., now part of Koppers, and Linden Stuart Jr. was most recently eastern sales manager of protective coatings for the Barrett Division, Allied Chemical & Dye Corp., New York.

Obituary



A. L. Forbes Jr.

A. L. FORBES JR., prominent Houston pipeliner, died Jan. 10 of a heart attack while on a business trip to Bangor, Maine. He had been elected president of the Pipe Line Contractors Assn. at its annual convention the previous day. Mr. Forbes was associated with El Paso Natural Gas Co. from 1930 to 1943, was vice president and general manager of Pressure Welding Co., a subsidiary, until 1945; and then became a partner in Associated Contractors & Engineers. In the following year, Mr. Forbes and Earl Allen formed a partnership under the same name. In 1947 it was incorporated and in 1949 the name was changed to Associated Pipe Line Contractors Inc.

Cities Service Asks Okay For Two Building Projects

A buildup of its storage facilities to increase daily wintertime maximum deliverability by 60 MMcf was sought last month in an application made by Cities Service Gas Co., Oklahoma City, to the FPC.

Cities Service wants to spend $1.2 million to replace two 16-in. lines in Franklin and Anderson counties, Kan., with a single 21-mile, 26-in. line, and to add 1000 hp to its Welda compressor station in Anderson county. The lines carry gas from the company's Colony and Welda storage fields to Kansas City.

In a separate application, Cities Service asked FPC for authority to add 340 hp at its Welch compressor station in Craig county, Okla. and 1020 hp at its Pierce City station in Lawrence county, Mo.; and to construct 15.4 miles of 20-in. line to replace a 16-in. section in Montgomery and Labette counties, Kan.

Cost of the latter project, which would provide more capacity for the firm's Southern Trunk and Quapaw-Springfield lines, is estimated at $754,800.

NACE Tulsa Section Plans Corrosion School

Plans have been made by the Tulsa section of the National Assn. of Corrosion Engineers for a three-day corrosion school to be held at Tulsa's Mayo hotel, Feb. 27-29.

This school for pipeliners will be conducted on a non-technical basis in order to acquaint field personnel with the "why and how" of corrosion control so they may participate more effectively in this phase of their companies' operations.

A series of discussions and a field trip including a practical demonstration of corrosion control will be conducted by pipeline men with broad experience in the mitigation of corrosion. Among subjects to be covered are rectifiers, expendable anodes, corrosion surveys, use of pipe locators, instruments and equipment, coating materials and their application, and insulating flanges and nipples.

Inquiries should be addressed to Y. W. Titterington, Standard Magnesium Corp., Box 1424, Tulsa.

Colorado Interstate Plans $3.5 Million Construction

A two-year construction program, estimated to cost nearly $3.5 million, is being planned by Colorado Interstate Gas Co., Colorado Springs, to enable it to meet demands of Rocky Mountain area customers. This plan would up capacity from 360 to 413 MMcf/day, and the company is further seeking to expand its system capacity to 438 MMcf daily.

At year's end FPC had granted temporary authorization for part of the facilities, including compressor units at the Panhandle field station increasing it from 4800 to 6600 hp, addition of a 1320-hp unit at its Kit Carson (Colo.) station, and construction of 49 miles of main line loop and laterals in Colorado.

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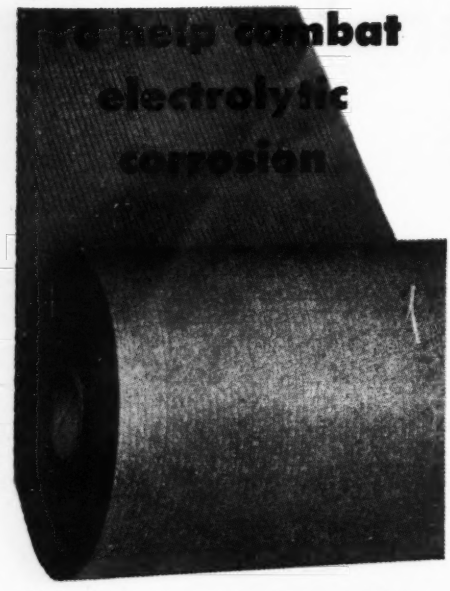

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Higher Coating and Wrapping Speeds. VITRON Underground Pipe Wrap is extra-reinforced with parallel strands of high strength glass yarn.

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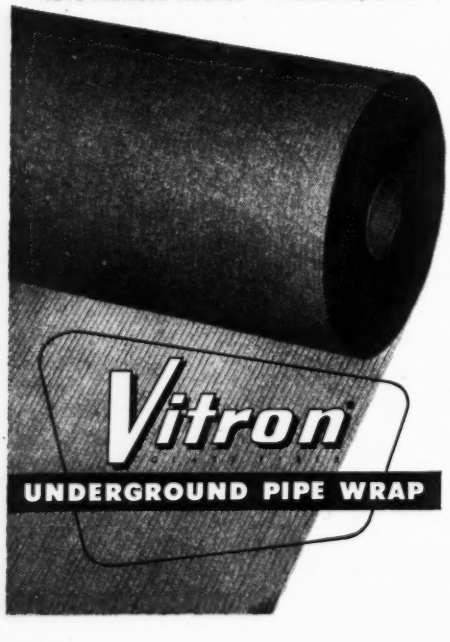


Two Firms Propose Texas-Alberta Reciprocal Plan

A plan sponsored by Panhandle Eastern Pipe Line Co., Kansas City, and Pacific Northwest Pipeline Corp., Houston, to deliver natural gas from Texas to nearly every major center in western, central, and eastern Ontario by 1953 is being discussed by representatives of the companies with Canadian officials.

The proposal, contingent on approval of three government agencies, is to trade equal amounts of natural gas from Texas and Alberta. Approval must be obtained from the Alberta Petroleum and Natural Gas Conservation Board, the Federal Power Commission, and Canada's Board of Transport Commissioners.

Reciprocal exchange of natural gas was previously proposed to the Alberta board by R. R. Herring of Houston, vice president of Prairie Pipelines Ltd. (see January *GAS*, p. 102).

2nd Quarter Allocations For Line Pipe Down

Line pipe allocations for the second quarter of 1952 will be substantially reduced, according to figures released last month by PAD. For natural gas lines, only 337,315 tons of pipe will be available, compared with 346,277 tons in the first quarter. Pipe for oil lines will drop from 447,105 to 423,445 tons.

Oil producers will get more oil field tubular goods during the second quarter, but the increase will still be well below that sought. PAD says 450,000 tons of steel for tubular goods will be available, representing an increase of 10,000 tons over the amount allotted for the first quarter. It should be sufficient, according to PAD, to provide for drilling 250 more wells than during the first three months.

Wimberly Calls For Gas Export Slow-down

Harrington Wimberly, FPC member, last month was widely quoted expressing the opinion that the states of Arkansas, Texas, Louisiana, Oklahoma, Kansas, and New Mexico—which are producing roughly 5½ trillion cu ft of gas a year—are committing too heavily of their reserves to interstate pipelines feeding fuel to eastern and northern markets.

He quoted figures and expressed fears that pipelines will export production so heavily that within 20 to 30 years these states will find their own industrial expansion crippled for lack of fuel for power.

"We are already at the danger point," he was quoted as warning. "It is time for local people and the producers to stop, look, and listen. They should analyze the situation—be put on the alert—or they will sell themselves right out of prosperity."

New Hampshire Job on Tap

Construction of New Hampshire's first natural gas pipeline will begin as soon as the snow is off the ground, E. E. Miller, vice president of Northeastern Gas Transmission Co., Springfield, Mass., predicted last month. Some 100,000 consumers in the Nashua, Manchester, and Concord areas will receive natural by mid-summer.

Building will begin a few miles north of Lowell, Mass. The Concord lateral calls for 43 miles of pipe which will require about 2200 tons of steel. Mr. Miller said that pipe for the New Hampshire work has been delivered or is scheduled to arrive in time for springtime construction.

TGT Files Revised Building Plan To Cost $128 Million

In a petition filed last month with the Federal Power Commission, Tennessee Gas Transmission Co., Houston, requested approval for a proposed $128,216,000 expansion program which would increase daily capacity of its system from the presently authorized 1310 MMcf to 1515 MMcf.

Peak day deliverability would be increased 200 MMcf through construction of an underground storage area in the Hebron field, Potter county, Pa., proposed by TGT and United Natural Gas Co., Oil City, Pa.

Tennessee also wants to build 591 miles of line paralleling its existing system, a 304-mile line from near Mercer, Pa. through the Hebron field to Utica, N. Y., and compressor units totaling 165,000 hp to be installed at new and existing stations.

FPC held hearings during 1951 on a similar application and granted part of it. The portion which was denied made the project unfeasible to TGT, which now has new evidence on the controversial part.

Final Approval Granted to Columbia Subsidiaries

Two Columbia Gas System subsidiaries—Cumberland & Allegheny Gas Co. and Manufacturers Light & Heat Co., both of Pittsburgh—have received final FPC authorization for construction of facilities in Maryland, Pennsylvania, and West Virginia.

Estimated cost is $2,433,137 for Cumberland and $11,100 for Manufacturers. Cumberland's program includes 57 miles of line in Maryland and West Virginia, two compressor stations with a total of 2080 hp, and conversion of an existing station to two-stage operation. Manufacturers will build 100 ft of line in Pennsylvania and exchange a compressor cylinder from a West Virginia station for a similar one from one of Cumberland's stations.

Export Company Established

A new corporation, Clark Bros. Pan American Inc., has been formed to act as the export company in Mexico and South America for Clark Bros. Co. Inc., Olean, N. Y.

In addition to handling Clark's engine and compressor products, the firm will maintain service and warehouse facilities. No change is contemplated in personnel now serving the South American areas.

Offices will be maintained in Mexico City, Caracas, Buenos Aires, Bogota, Lima, and Rio de Janeiro.

Ohio Storage Line Asked

A 31.2-mile, $1,440,000 line in central Ohio for transporting gas to underground storage and market areas has been requested by Ohio Fuel Gas Co., Columbus. It would extend from the company's Treat compressor station in Licking county to its Weaver storage station in Richland county.

The application to the Federal Power Commission stated that an average of 260 MMcf daily will have to be sent north from Treat by next July and that the proposed line would up capacity for delivery of gas northward by the necessary 65 MMcf daily.

PROGRESS REPORTS

Planned

AMERE GAS UTILITIES CO., Charleston, W. Va. Docket G-1716 for 33.6 miles of line in West Virginia.

ARKANSAS-MISSOURI POWER CO., Blytheville, Ark. To build line from Big Inch to serve 12 towns in two states. Construction scheduled for 1952.

ATLANTIC SEABOARD CORP., Charleston, Docket G-1850 for four new compressor stations aggregating 18,200 hp, with additional 1100 hp unit to be installed in existing station, all in West Virginia.

CENTRAL WEST UTILITY CO., Kansas City, Docket G-1682, four alternate plans to serve Clay county, Mo.

CHICAGO DISTRICT PIPELINE CO., Joliet, Docket G-1756 to build 15 mile, 30-in. line in Cook county, Ill.

CITIES SERVICE GAS CO., Oklahoma City. Docket G-1867 for 21 miles of line in Franklin and Anderson counties, Kan. and addition of 1000 hp unit at its Welda station in Anderson county.

EAST TENNESSEE NATURAL GAS CO., Knoxville. Docket G-1336 for a 100-mile, 16-in. line from near Knoxville to Kingsport, Tenn. with appurtenant equipment.

EL PASO NATURAL GAS CO. Docket G-1631 for 112.9 miles 30-in., 179.5 miles field lines, 98,200 hp added capacity plus 36,540 hp in field stations, field gathering systems, and miscellaneous facilities.

EL PASO NATURAL GAS CO. Docket G-1630 for 25,050 hp at new and existing stations, 50.9 miles field lines, 2700 hp at a field plant, gas wells and miscellaneous facilities.

GLACIER GAS CO., Butte, Mont. Dockets G-1816, G-1817, G-1818 for 285 miles of 20-in. from northeast of Kalispell, Mont. to Spokane, Wash.; 91 miles of 8⅝-in. from Spokane to Lewiston, Idaho; 120 miles of 16-in. from Spokane to Hanford, Wash.; 130 miles of 12¾-in. from Spokane to south of Trail, B. C.

GULF-MICHIGAN GAS TRANSMISSION CORP., St. Louis, for 680-mile, 30-in. line from Perryville, La. to St. John, Ind. with three compressor stations totaling 30,800 hp. Project postponed indefinitely because of scarcity of pipe.

KANSAS NEBRASKA NATURAL GAS CO., Hastings. Docket G-1857. To build 179 miles of line in Kansas and Nebraska and rearrange certain compressors, stub lines and metering stations to serve new main line industrial customers.

MIDSOUTH GAS CO., Little Rock, Ark. Dockets G-1445 and 1680 for 240 miles of line in Greene, Crittenden, St. Francis, Lee, Phillips, Monroe, Woodruff, Poinsett, and Cross counties, Ark.

MISSOURI CENTRAL NATURAL GAS CO., Macon, Mo. Docket G-1509 for 25 miles of 6-in. from Moberly to Macon, Mo.

NATURAL GAS STORAGE CO. OF ILLINOIS, Chicago. To build facilities to develop an underground storage area 15 miles from Kankakee, Ill.

NEW RIVER GAS CO., Radford, Va., 50-mile line from Atlantic Seaboard's system in W. Va. to a point near Radford with laterals to four towns.

NEW YORK STATE NATURAL GAS CORP., Pittsburgh. Docket G-1824 for 104.7 miles of line in Pennsylvania and New York and installation of an additional 2420 hp at two existing compressor stations in Westmoreland and Tioga counties, Pa.

NORTHERN NATURAL GAS CO., Omaha. Dockets G-1442 and G-1511 for 13.9 miles of branch and a measuring and regulating station near Humboldt, Iowa and 1.5 miles of branch and a similar station near La Platte, Neb.

NORTHWEST NATURAL GAS CO. Docket G-996 for 645 miles of 18-, 20-, 22-, and 24-in. line in Washington, Idaho and Oregon together with laterals and four compressor stations aggregating 24,750 hp.

OHIO FUEL GAS CO., Columbus. Docket G-1862 for 31.2 miles of line in central Ohio, extending from Treat compressor station in Licking county to Weaver storage compressor station in Richland county.

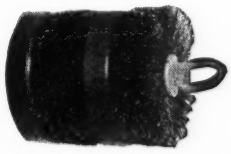
PACIFIC GAS & ELECTRIC CO., San Francisco. Docket G-1651 for 141 miles 34-in. loop and 22,780 hp at authorized stations.

PACIFIC NORTHWEST PIPELINE CORP., 2175 miles of 26-in. from southern Texas to Seattle, Wash., Vancouver, B. C., via Oklahoma, Kansas, Colorado, Wyoming, Idaho, Oregon, Washington.

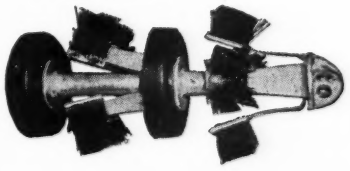
PIEDMONT GAS CO. INC., Hickory, N. C. Docket G-1617 for 28 miles 6-in. line.

THE PIG WITH THE POKE — CLEANS PIPE LINES

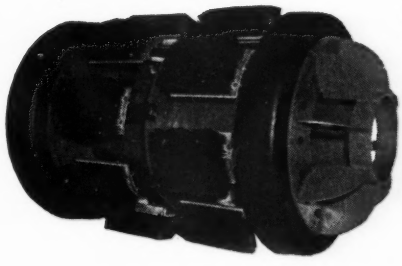
THE VERY LATEST
Williamson Pipe Line Pigs*
FOR CLEANING
NATURAL GAS PIPE LINES



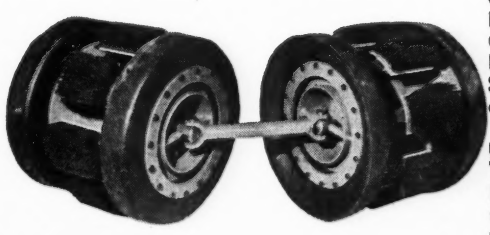
4" Size—TYPE JRN. 2" to 4" sizes. Will pass 1½ R-90° Bends. No valves other than full diameter thru port valves. Use TYPE SCN-51 for 6" size.



8" Size - TYPE WC-11. 8" to 14". Will traverse 6-foot radius field bends, full diameter side openings at 45°. SPRINGS COMPENSATE for BRUSH WEAR.



20" Size - TYPE GP-2. 16" to 30" 200-lb. SPRING forces the brushes against pipe wall — COMPENSATING for WEAR. Will traverse round opening gate or plug valves. SPRINGS and BRUSHES are identical and interchangeable for all types and sizes of GP-PIGS.



24" Size - GP-3. 18" to 30". Sizes will pass 1½ R-30° Bends. SPRINGS COMPENSATE for BRUSH WEAR ASSURING full section cleaning efficiency.

GP-3 consists of two Type GP-1 Pigs— Each Unit may be used as individual pig.

*Patents Pending

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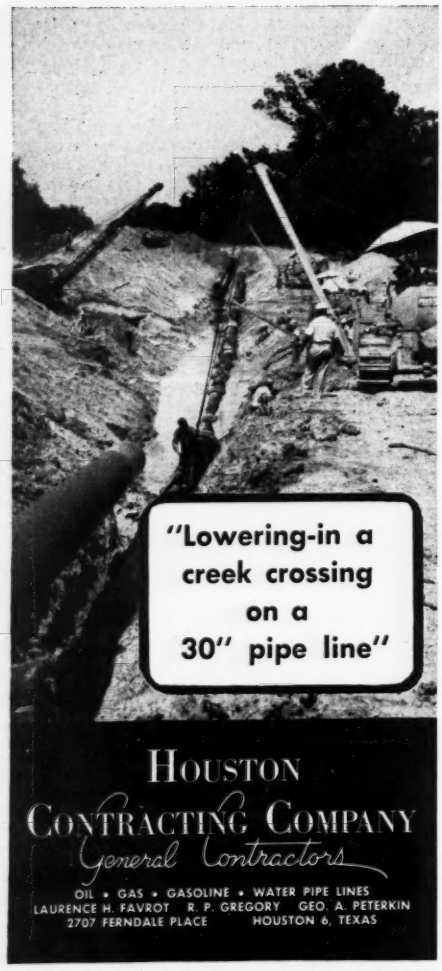

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POTOMAC GAS CO., Washington, D. C. Docket G-1768 for 14,000 ft of natural gas pipeline in Arlington county, Va.

ROCKLAND LIGHT & POWER CO., Nyack, N. Y. Docket G-1728 for 22 miles transmission line between Orangetown and Tomkins Cove, N. Y.

SHENANDOAH GAS CO., Lynchburg, Va., for 59 miles from near Cedarville, Va., to cities in Virginia and West Virginia.

SOUTHERN CALIFORNIA GAS CO. and **SOUTHERN COUNTIES GAS CO.,** Los Angeles. Docket G-1718 for 45 miles 30-in. line between Whitewater and Desert Center, Calif., 6 miles 30-in. from Blythe, Calif. station to Calif.-Ariz. border, and two 1760-hp compressors at Blythe.

SOUTHERN NATURAL GAS CO., Birmingham, 127 miles of various size pipeline and two compressor stations totaling 11,050 hp in Alabama, Georgia, Mississippi and Louisiana.

TENNESSEE GAS TRANSMISSION CO., Houston, 591 miles of line parallel to existing system, a 304 mile line from near Mercer, Pa. to Utica, N. Y. with a total of 165,000 hp to be installed at new and existing compressor stations.

TEXAS GAS TRANSMISSION CORP., Owensboro. Docket G-1847 for 407 miles 26-in. loop line on sections of existing line between Bastrop, La. and Hardinsburg, Ky. together with installation of 14,620 hp.

TEXAS-OHIO GAS CO., Houston. Docket G-1810 for 1350 miles 30-in. from Hidalgo county, Texas through Arkansas, Mississippi, Tennsssee, and Kentucky terminating near Spencer, W. Va. including 13 compressor stations totaling 140,000 hp.

TRANS-CANADA PIPE LINES LTD., for 2200-mile line from Alberta to major cities as far east as Montreal.

UNITED GAS PIPE LINE CO., Shreveport. Docket G-1843 to build an 11.3 mile line in Terrebonne parish, La.

UNITED NATURAL GAS CO., Oil City, Pa. Docket G-1854. To build 10.5 miles 12-in. line and replace 6.5 miles 8-in. line in Venango county, Pa. and replace 10.1 miles of 3-, 4-, 5⅝-in. with 6-in. line in Warren county, Pa.

UTAH NATURAL GAS CO. to build a 360-mile line from the San Juan basin to Salt Lake City. A secondary line would run from Last Chance field (Wayne county, Utah) through Sevier and Sanpete counties.

UTAH PIPE LINE CO., Dallas, for a 392-mile line from Aztec, N. M. to Salt Lake City. Includes 374 miles of 22-in. and 18 miles of 16-in.

WESTCOAST TRANSMISSION CO. INC., Wilmington, Del., 615 miles, including 277 miles from Sumas, Wash. to Portland, Ore. with short branches to a number of cities in the two states; 266 miles south from the Osoyoos, B. C. area to Spokane and Hanford, Wash.; and 72 miles of laterals and 13 measuring stations.

WEST TEXAS GAS CO., Lubbock. Docket G-1831 for 35.2 miles of pipeline and compressor stations aggregating 2010 hp in Potter and Randall counties, Texas.

Approved

COLORADO INTERSTATE GAS CO., Colorado Springs. Docket G-1667. For 49 miles main line loop and lateral lines in Colorado; increase compressor installation at the Panhandle field station from 4800 to 6600 hp; and install additional 1320 hp unit at Kit Carson (Colo.) compressor station.

TEXAS GAS TRANSMISSION CORP., Owensboro. Docket G-1847 for installation of 5280 hp compressor station near Madison, Ind. and additional units at existing stations at Kenton, Tenn. and Calvert City, Slaughters and Hardinsburg, Ky.

Under Way

ALGONQUIN GAS TRANSMISSION CO., Boston, facilities to serve designated companies in Mass., R. I., Conn., and N. J. Includes 253 miles of main line and 279 miles of laterals.

CENTRAL KENTUCKY NATURAL GAS CO., Charleston, Docket G-1648. L. R. Young Construction Co. at work on 13 miles 20-in. loop northeast from North Means, Ky.

CUMBERLAND & ALLEGHENY GAS CO., Pittsburgh. Docket G-1773 for 35 miles 10-in. from Mountain Lake park, Md. to Monongalia county, W. Va.; 11 miles in various sections of Preston county, W. Va. and Garrett county, Md.; 725-hp station in Garrett county, and 450-hp station in Preston county.

EL PASO NATURAL GAS CO. Docket G-1629 for 10.4 miles 30-in., 36 miles field lines, 37,160 hp in main line stations, 18,910 hp in field stations, field gathering systems, and miscellaneous facilities.

IOWA-ILLINOIS GAS & ELECTRIC CO., Davenport. Docket G-1721 for a 41-mile, 10-in. line from Washington county to Cedar Rapids, Iowa. Construction to begin third quarter of 1952.

NORTHEASTERN GAS TRANSMISSION CO., Springfield, Mass. 1952 construction plans include 100 miles 16-in. from Greenwich, Conn. to Springfield, Mass.; 23 miles 4-in. from Granville, Mass. to Torrington, Conn.; 26 miles 6-in. from Framingham to Fitchburg, Mass.; 45 miles of 8-, and 4-in. from Lowell, Mass. to Concord, N. H. and 15 meter stations.

NORTHERN NATURAL GAS CO., Omaha, has Reese Construction Co. at work on 181 miles of 4- to 12-in. gathering system in Hugoton, Kan., to be completed April 1952.

OHIO FUEL GAS CO., Columbus, Docket G-1639 for 61.3 miles in Sandusky, Elyria, and Dayton, Ohio areas. H. L. Gentry at work on 26 miles of 20-in. from Wellington to Elyria, Ohio and Sheehan Pipe Line Construction Co. building 25 miles of 20-in. near Xenia, Ohio.

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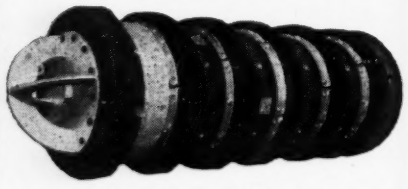
Designed and Proven By Pipeline Men



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Unless you are using the Expansible Cleaning Machine, your lines are not being thoroughly cleaned.

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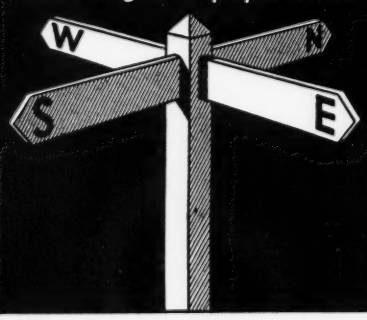
"serving all pipelines"



PIPELINE COATINGS and WRAPPING MATERIALS

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